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Combination with Telegraph Companies Would be Dangerous to Independents.

Unconfirmed rumors which have been afloat in regard to the situation in Ohio have dealt with a possible alliance between the companies operating Independent long-distance lines and one of the great telegraph companies, which, it has been stated in current gossip, might have furnished the money to swing the control of the Independent companies.

It is the opinion of many well informed men that the purchase of a controlling interest in any considerable number of connecting Independent companies by one of the great telegraph corporations, would be no less an injury to the Independent telephone interests, and to the public dependent upon competition for good service and reasonable rates, than the actual combination of these Independent companies with their Bell rival.

Apropos of this situation, a New York man who, in financial circles, frequently comes in contact with persons very closely in touch with the movements of the Bell telephone and the Western Union and Postal telegraph companies, has written to us as follows:

"I am assured on the very best of authority that everything done by the two telegraph companies is after fullest consultation with the Bell people, and done in full view of the fact that very shortly the two telegraph companies and the Bell will be under one ownership and management.

"Some weeks ago the Bell company acquired a large interest in, if not the control, of the Western Union. At that time it was the intention to put in Mr. Vail as president of the Western Union, and Mr. Baker, formerly with the Postal, but now with the Bell, in active management of the Western Union. This program was not carried out, I learned a few days ago, in order that certain deals might be made with the Western Union as a telegraph company that could not be made with the Western Union as a part of a telephone company.

"The Bell people have set out deliberately to control the telephone and telegraph business of the United States. They have at length wakened up to the fact that they must reckon with the Independents. Some newspaper comments state that, the Bell being in touch with one telegraph company, it is very likely that some of these Ohio and Indiana moves which now appear so puzzling indicate that the other telegraph company is trying to make alliance with the Independents. This view is based on the very wild supposition that the two tele-

graph companies are competitive, while both are owned by people in close affiliation with the Bell."

For some time, although the movements of these corporations, relative to one another, have been very carefully concealed, it has been felt in financial circles in New York and elsewhere that their broad plans were very closely related. It is believed that Mr. Vail and Mr. Mackay have ambitions in the way of consolidating all wire using companies into a gigantic corporation which could be used as a basis for enormous financial projects, and absolutely control the rate proposition throughout the country.

The only practical safeguard which the people dependent upon electrical communication, as a necessity of business and social life, seem to have, lies in the combined efforts of the Independents. By close combinations among themselves the Independents, who have demonstrated their strength in competition of the most vigorous character, will reap in a legitimate business way for themselves the rewards which have attracted the attention of some of the leading financiers of New York.

Suitable Tools.

An old proverb says that it is the poor workman who blames his tools. Poor workmen often do attribute their lack of success to poor or insufficient tools; but no one appreciates the value of the proper tool like the highly skilled expert. He knows how often, for lack of them, apparatus is marred and damaged, and the workman's time needlessly wasted. Thus there are two considerations which offer strong reasons for providing men with suitable tools—the preservation of apparatus, and economical use of time.

Since the beginning of the telephone business, general and special tools have been developed and perfected until now we have quite a respectable array. There is a list of pliers, long enough to fill several pages in the catalog. They are adapted to seize firmly any part of telephone apparatus which should be thus handled. There are wrenches and screwdrivers of all sizes and shapes, adapted to work in all locations; and many other items.

Now, since the cost of these tools is trifling compared to their value, managers who look at the matter from a dollars and cents maintenance standpoint see to it that their men are liberally supplied with them. It pays well, in better work and more of it.

The Talkless Wireless Fake.

Unwary newspapers are still falling beneath the spells of talkative installers of talkless wireless telephone stations. By this time it is pretty well known to the initiated that the practice of representatives of certain companies which sell wireless telephone stock is to blow into a town laden with a few condensers and coils and a choice "line of dope" to hand out to the local editors. The next day the people in Our Town are talking about the new scientific wonder that has "landed in our midst," and there are all sorts of rumors afloat about putting the old telephone company out of business because you will be able to talk through your hat to Cousin Peter out on the other coast, if—and here's the point—you do your part in supporting this new local industry, which thinks so well of the place that it is going to make one of its homes right here in Our Town. The stock salesmen get busy while a tower is being put up and the newspapers are being shown how the sound waves travel. Later, the tower forgets to be in business, and the buyer of the stock wants to unload, but looks in vain for a purchaser.

The wireless telephone is an interesting product of scientific thought, and, in its present stage of development, may have a certain limited field of commercial application. But it will not appeal to a trained scientist or business man as an investment of the sort which should be distributed among the general public. The methods of at least two wireless telephone promotion companies now in the field are only comparable to those of the mining stock boomer who advertises in the Sunday newspapers that you must buy quick because the price is going to be raised.

Telephone men owe their fellow townsmen the duty of exposing these robbers whenever they show up.

Gary on the Independent Industry.

Theodore Gary's admirable discussion of the Independent telephone business, written from the broad standpoint of a man who has been responsible not only for the rapid development, but the successful operation, of a large number of important plants, should be read in connection with the paper by Mr. Caldwell, of the bond department of the American Trust and Savings Bank, printed on page 502. Mr. Gary's authoritative statement of the qualifications actually possessed by telephone securities issued upon properties which are well founded and well managed, it will be observed, corresponds exactly to the requirements for a good security laid down by Mr. Caldwell. And Mr. Caldwell places the element of convertibility, which, as Mr. Gary states, telephone securities possess to a minor degree, as the least important of the essential elements in a good investment.

Distributed local ownership in the telephone business is a factor of far greater importance. If the securities are good, people will be glad to hang on to them; and if the holders live in the territory where the company operates, this is an ideal condition in favor of the enterprise.

Mr. Gary occupies a position which particularly qualifies him to speak upon this subject, and his statement merits far more than ordinary attention. As a former president of the International association, and a man who always has shown, and continues to show, keen interest in Independent telephony as a whole, he is in a position to have an insight into the problems of the industry on a National scale. As the head of the extensive chain of important properties which have come to be known as the Gary system, he has successfully confronted for years the practical problems of financing and developing telephone systems in the first place; and, afterward, of operating them and giving the public a satisfactory service and providing for growth.

We believe, so strong are the fundamental elements making for success in the Independent telephone industry, that whenever all the readers of TELEPHONY become as well informed as is Mr. Gary, then every man connected with the industry will be as enthusiastic about the future as is the head of the Gary system.

The Strength of the Industry

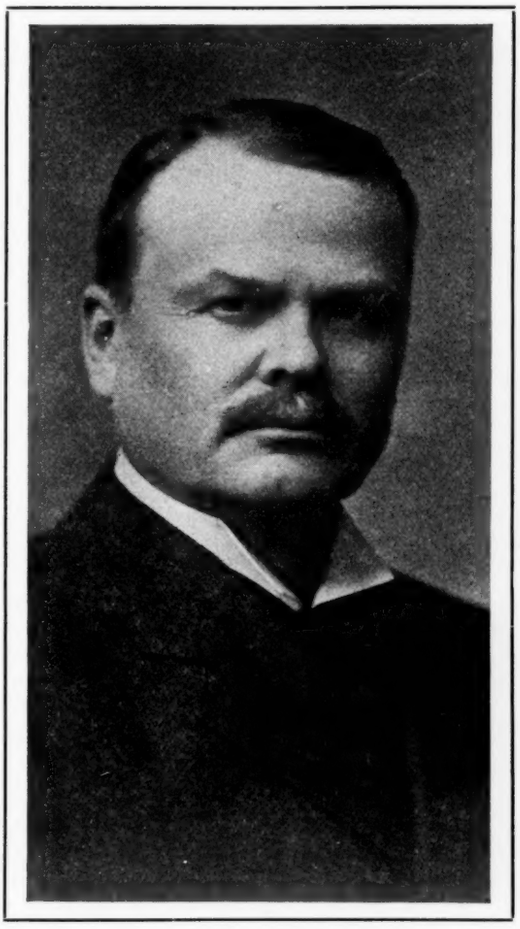
Independent Business Stronger Than Ever Before—Present Standard Construction Depreciates Slowly—Local Ownership a Factor in Safety—High Returns More Important Than Extreme Convertibility—The Outlook

By Theodore Gary

October 27, 1909.

To the Editors of TELEPHONY,
Chicago, Ill.

In your letter of October 14 you invited me to set down my views as to the general condition of the Independent telephone business at this time. The situation, taken as a whole, seems to be much better than ever before. The reason for this is that the companies generally are in better financial condition; rates for service are being advanced to a point that shows a profit on the business. The public is gradually coming to the knowledge that what was a fair rate for a small development is inadequate for a more extended service, and the authorities are granting increases in rates commensurate with the growth of the service. Apparatus has been brought to such perfection that few changes are even being suggested by the operators; the wire plants, built as they now are, are in highly permanent form. Shorter and heavier poles support high class messenger strands, on which are strung cables of lead-encased copper wires. These run into metal distributing boxes, from which insulated copper wires run in short spans direct to the subscriber's stations. This type of construction greatly reduces operating and maintenance expense; in fact it has brought it down to a minimum. With such a development of the art and careful engineering and good operating ability available at moderate prices, the business has been placed on a much better basis than it was a few years ago.



Mr. Theodore Gary.

The more I study the business and compare it with others, the better it seems. While the business is not absolutely fool-proof, it has been more nearly so in the past than any that I know of. While it is possible to fail in the telephone business, the failures have been so few, notwithstanding the wild cat financing, the inexperience of promoters and operators, the unfinished condition of the apparatus, the waste in wire plants and the consequent excessive depreciation, that now, with these detrimental factors eliminated, it deserves to be put in a class by itself as practically free from risk.

When the field is surveyed, it is a wonder that the business has been able to attain such wonderful success. The only danger ahead of us at this time, as I view it, is in large consolidations that may be undertaken by men who are not telephone men, and who do not understand that it needs the same business sagacity, and the guiding hand of experienced men, which other business requires. Inexperienced capitalists may still see in it a splendid field for promoters, and undertake impractical things, as the ordinary telephone property looks very juicy to the promoter, and will generally, judging from the past, outgrow the most sanguine promoter's representations.

If the Independent movement is confined, as I believe it will be, largely to local companies, which may be affiliated for mutual protection and interchange of business, with each financed, owned, and operated largely by local people, with enough telephone skill connected with each property to direct the business along proper lines, the business has less hazard than any other. This is true for the reason that the income is fixed and regular, and varies less than any other business; is not effected by panics, droughts or wet seasons; collections are always good, because the amounts are small and the service rendered is absolutely indispensable and is the cheapest service that is sold.

That the securities of Independent companies generally have not found a market in the larger centers is fully accounted for in the fact that it is impossible to have many Independent telephone companies issue securities of sufficient magnitude to warrant the larger centers in dealing in these securities; it being impractical to have them listed on the large stock exchanges on account of the small issues. For this reason many people have been discouraged because it has generally been necessary to find a local market for Independent telephone securities. But this, instead of being a risk, has been the source of great strength of the Independents. For this reason these securities are permanently held largely in the localities where the companies operate, by people who take interest in the affairs of the localities, and who become staunch supporters of the property on account of their financial interest.

In the immediate field in which I am interested, the situation is stronger than ever, and growing better. The field is well developed by Independent exchanges and long distance lines. There are some localities which it would be desirable to have covered better than at present, but most of these not covered by Independents are undesirable, so far as operating at a profit is concerned. There is a large amount of territory that cannot be operated for profit, and must be operated by Mutual companies. Some of these companies have been misled temporarily, and are not affiliated with the Independent movement as strongly as they should be. This has all come about on account of the Independents not having as many long-distance lines as was thought to be necessary, and by a wrong understanding on the part of the Mutuals.

This is largely a mental condition, as most local companies have no use for long-distance service. All they need is service within thirty to fifty miles of their respective exchanges; but it has been a fruitful place for Independents to stumble, and for a time the Independents talked just as our competitor talks; saying that it was necessary to have a universal service if a telephone in a place of business or

residence was to be of real value. In my own observation, I find this idea to be the greatest fallacy yet set in motion by our competitor. Some of our exchanges located within a comparatively short distance of cities have succeeded, and had more telephones in service than our competitor, before long-distance lines were available. I am operating one exchange without any long-distance lines other than to local points, and I find no inconvenience and no particular demand for an extended long-distance service from our subscribers.

Upon making an inquiry at one of these points in which I am interested, I found that there had never been but one call for New York City over our competitor's lines, and this call was never completed, because the parties could not make each other understand.

If the Independents and the public at large will simply stop and think for a moment, they will see that the plea for universality of telephone service is a theoretical one and rarely is there a call to put it in practice. While it may be desirable for New York City to connect with all the tributary territory within one thousand miles of that city, it certainly does not extend much farther than that, and the practical talk is limited to a few hundred miles, and a few large commercial centers. No company could afford to maintain a pole line one thousand miles long for thousand-mile talks only, except between places like New York and Chicago.

As I consider the Independent telephone business, from every point of view, I conclude that it is safe, and involves less risk, when fairly managed, than any other. If this is true, it must naturally follow that its securities issued on values tangible or intangible, must be good. And as an evidence that they are good, it is only necessary to make an inventory of the various companies' issues throughout the country. While these securities, as a class, are selling at much less than they are worth, this is well accounted for from the fact that there is no general market for the securities, and there never can be, for the reasons before mentioned; that the issues are too small to be handled by the larger centers. While the companies have been somewhat handicapped in the past on account of the narrow market, it gives a great guarantee for strength to know that the securities are generally owned by local people in sufficient quantities to insure an interest in the welfare of the company. There are enough of these holders in nearly every community to at least give the balance of power, and guarantee to the Independent company moral support and strength. The human element is so close to these companies that the business is swung to them, even with a service in the same class the competitor furnishes. The Independents have the advantage, as has been and is being demonstrated every day. And in the matter of service, the Independents give a more satisfactory service to the public, if not longer lines. It is more satisfactory because they are close to the people and are able to more nearly meet their views as to what the service should be.

This will continue, and it is a factor that our competitor has never been able to get over, and never can. Our organizations are made up in the same way, with more or less local interest, financial, social and everything that goes to make up the lives of the citizens taking part in the general affairs of the communities, of which the managers and directors interested in these various Independent companies are members. In contrast we find employes of our competitor, who depend entirely upon their salaries for their support. Their influence as a rule is limited on this account.

Therefore, if the whole business is looked at from this point of view, I believe it will be conceded that the Independent telephone business is the best business in the world, furnishing a service that is permanent and indispensable.

All that is necessary to insure success is to conduct it along fair business lines. The business is a success, the securities make desirable and conservative investments, returning a larger rate of interest on the investment than any other safe security, the rate being high not on account of hazard or risk, but because of the narrow market that has existed because the issues are too small to be traded in by the larger houses in the larger centers.

Any well managed company located in a good territory can establish a credit that will enable it to secure all the funds it needs to develop its property at rates of interest slightly higher than any high-class corporation bonds. Building credit is a process for telephone companies to consider, as well as individuals. I have my companies well established, and all are getting all the funds they need to carry on own extensions and development work. The investor is the gainer in the larger returns on his safe investment in our securities, are large only because our small issues are not dealt in on the big stock exchanges.

Yours very truly,

Theodore Gary.

Simple Apparatus for Checking the Speed of Operators.

By Wm. R. L. Dwyer.

In the larger exchanges a fairly accurate record of the time required by each operator to answer a call is obtained by means of numerous "service tests" taken at regular intervals, from which are computed the average speed of each operator.

However, in the smaller exchanges, where the duties of the manager or chief operator include bookkeeping and the handling of numerous other details, there is seldom time to take regular service observations, so there has long existed a demand for some simple method of obtaining this information automatically, or semi-automatically, and without the operator's being aware that her speed in answering calls is being watched.

This information is of vital importance to the manager as it helps him to arrange his operating schedule to better advantage, and to eliminate inefficient members of his operating force.

The scheme shown in Fig. 1 has been found very successful when it was not desired to have a permanent record of each operator's time, but only to observe when a subscriber has been waiting too long for "central" to answer him.

As will be seen on referring to the diagram, when a subscriber rings in on the first section of a magneto board the shutter drops and closes the night alarm circuit. This, in turn, lights the miniature light associated with that particular board, located on the manager's desk. When the operator answers the call the drop is restored and the lamp extinguished. If the lamp remains lighted too long, it is evidence that the operator is not attending to her duties properly. The manager can then "go in on her board" by means of an order wire key connecting with his telephone, and call her attention to the fact that a subscriber is waiting too long for an answer. The switch shown is for the purpose

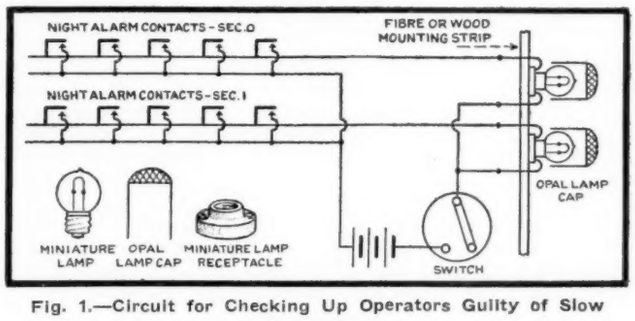


Fig. 1.—Circuit for Checking Up Operators Guilty of Slow Answering.

of opening the circuit at night or whenever the manager is not in the office, in order that the batteries may not be too quickly exhausted or the miniature lamps burned out.

Another arrangement, outlined in Fig. 2, employs a dial switch by means of which service testing apparatus may be connected to any section. The apparatus consists of an old Morse telegraph register which makes a record on a moving paper tape in the form of dots and dashes, thus showing how often, and for what lengths of time the relay circuit was opened or closed. This register has been superseded in regular telegraph work by the sounder, but is still employed in some fire department signaling and wireless telegraph systems.

The relay shown in Fig. 2 serves two purposes. In some types of switchboard the night alarm contacts are located on the face of the board, and if sufficient battery is used to properly operate the apparatus there is excessive sparking at the contacts. From this the operator knows that the apparatus is connected to her particular section, and will consequently be careful that all calls are promptly answered, or will restore the drop without answering and let the subscriber ring again. By introducing a relay, however, a much weaker current can be employed and the sparking reduced until it is not noticeable.

The relay also serves to open the register circuit when the night alarm circuit is closed, and vice versa. This is necessary because most registers are built to operate on closed circuits, as in fire alarm work.

This device may be connected to any section of the switchboard. If a subscriber is not answered promptly the fact will be recorded on the tape by a dash, varying in length according to the time he was obliged to wait for "central" to plug in on his line and restore the drop.

Fig. 3 shows how a simple call recording device may be made of an old relay and a small register or counter such as may be procured from the Veeder company for $1. The operation of this device is as follows: When the drop falls and closes the circuit, the relay pulls up its armature, which, being connected by a wire link with the lever on the register, advances the register one number, say from 491 to 492.

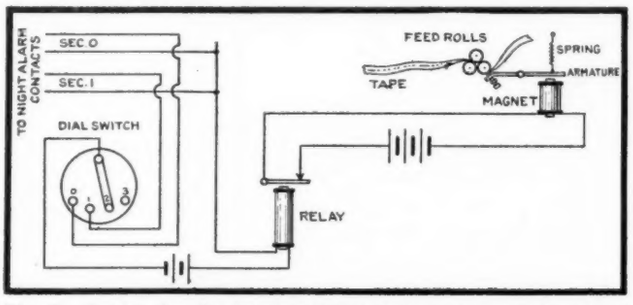


Fig. 2.—Device for Registering Delayed Answers at Subscribers' Switchboard Positions.

When the drop shutter is restored by the operator the relay releases the lever, and the register is ready for the next call.

Of course, while using any of the devices here described all night alarm contacts must be regularly inspected and kept in especially good condition. These devices could also be used on common battery boards if connected to the pilot relays.

The only objection to their use is that in case two or more calls come in at one time the register would show them as one call, and the operator might be blamed for being slow when in reality she had answered two or more calls in the time indicated. However, this seldom happens in actual practice, and a very good average may be obtained with the aid of these devices. Certainly far better results are possible than when there is no systematic attempt at supervision of the service.

British Actors and Newspaper Writers.

The following item from the London *Globe* is reproduced to show what is, perhaps, being done in the way of educational telephone publicity in Great Britain:

"Some time ago we commented on the use of the telephone on the stage, but the subject is too vast to be briefly dismissed within the compass of one note. It cannot be that actors and actresses have no knowledge whatever of the telephone outside the theater, but this would seem to be the case judging from the way in which they handle it on the stage. In the

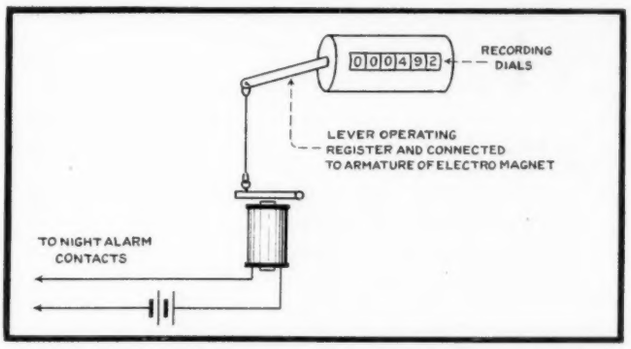


Fig. 3.—Arrangement for Automatically Recording the Number of Calls Answered.

first place, the machine is usually put on a table in the center of the room, where it is horribly in the way of everything else. But worst of all, the actor seldom thinks of ringing up the central office. He lounges gracefully to the table, takes up the mouthpiece casually, and says: 'Hullo, Jones. Is that you?' And curiously enough it always is Jones, who appears to spend his life hanging onto the other end of the wire. Or, if the actor does remember that there is such a thing as the exchange, he does not trouble to ring it up; he merely raises the telephone to his lips and says, 'Put me on to 92 X,' and there he is at once. Another strange thing is that he seldom has any difficulty in making himself heard, although he seldom masks his beautiful lips with the mouthpiece. And, lastly, he rarely, if ever, rings off. We trust that the new secretary will see to it that special courses of instruction in the proper handling of the telephone are given to all aspiring young actors and actresses at the establishment which was founded by Sir Herbert Tree."

Perhaps the actors would say "let well enough alone." At any rate, their secret of painless telephoning would be worth having at times.

Patent for Current Controlling Device.

The Dean patent No. 722,212, for a current controlling device for telephone circuits, the purpose of which is to prevent the greater part of a steady current passing through the subscriber's receiver, has been held not to be infringed by device of the Manson patent No. 818,897, which operates on a different principle. The Dean patent is one which depends upon the fact that resistances are so arranged that the receiver is on a line which is opaque to direct currents and a conductor of alternating voice currents. The Manson device depends upon a balance of electro motive forces due to the use of a "Wheatstone bridge" arrangement, and the receiver in this device is not in what may be called a territory opaque to any kind of current. Under these circumstances the court held that there was a different philosophy at the foundation of the two systems. Therefore, there was held to be no infringement.

Kellogg Switch-board & Supply Co. vs. Dean Electric Co., 168 Fed., 549.

The Humming Telephone*

A Contribution to the Theoretical and Practical Analysis of Its Behavior

By A. E. Kennelly and Walter L. Upson

Observation Series 5. Effect of Resistance in Primary or Secondary Circuit.—In this test a single tube of constant length (86.5 cm. or 34 in.) was used. It was of pasteboard, had an internal diameter of 5.1 cm. (2 in.) and weighed 113.5 gm. This length happens to be about midway between the ascending intersections of pitch lines *I* and *II* in Fig. 2 measured on the mean-frequency line of 825~. That is, the tube-length selected favored each of the lines *I* and *II* nearly equally. The battery e.m.f. of 8.6 volts was the same as in all previously described measurements. The same telephone receiver and induction coil were also used. Substantially non-inductive resistance was introduced, by rheostat, into either the primary, or the secondary, circuit at will, leaving the connections of Fig. 1 otherwise unchanged.

After starting the loud humming note with no extra resistance in either circuit, resistance was gradually inserted into the primary circuit until the note, diminishing in amplitude, finally disappeared. The extra resistance in the circuit at the extinction of the tone was recorded, under the name of "*extinguishing resistance*." Resistance was then withdrawn from the primary circuit, and after the loud note had been re-established, was introduced gradually into the secondary circuit, until again the note was extinguished. The secondary extinguishing resistance was likewise recorded. The same tests were repeated with the telephone receiver terminals reversed.

It was found that both the primary and secondary extinguishing resistances repeated themselves very fairly (within about 5 per cent) in successive trials. In order to obtain the best comparative results in successive tests, it was found desirable to tap the transmitter gently when approaching the condition of extinction.

Quality of Transmitter.	Transmitter.	Extinguishing Resistances. 1st Position of Rec'r. R (Pri.).	1st Position of Rec'r. r (Sec.).	2d Position of Rec'r. R (Pri.).	2d Position of Rec'r. r (Sec.).	Average. R.	Average.
OK.	T_3	43	3,100	50	2,300	46.5	2,800
	T_5	23	3,050	14	3,000	33.5	3,025
	T_6	55	4,300	43	4,000	49	4,150
	T_4	25	2,300	31	1,900	28	2,100
	T_8	45	3,900	40	2,600	42.5	3,250
	T_9	31	3,000	69	3,800	50	3,400
	T_7	27	2,600	26	1,600	26.5	2,100
	T_8	30	2,600	30	1,700	30	2,150
	T_9	31	2,700	44	2,300	37.5	2,500
	T_{10}	47	3,900	46	3,900	46.5	3,900
	T_{11}	43	4,100	74	3,800	58.5	3,950
	T_{12}	33	2,600	21	1,250	27	1,925
	Mean	36.1	3,180	43.2	2,696	39.6	2,937
Down in Volume.	T_{13}	10	750	10	700	10	725
	T_{15}	6	390	—	—	6	390
	T_{16}	6	900	12	1,000	9	950
	T_{24}	17	1,400	20	1,500	18.5	1,450
	Mean	9.75	860	14	1,070	10.9	879
Thick Quality.	T_{14}	62	4,900	66	2,300	64	3,600
	T_{17}	50	9,000	70	10,000	60	9,500
	T_{22}	52	7,000	75	8,000	63.5	7,500
	T_{23}	66	5,300	78	6,700	72	6,000
	Mean	57.5	6,550	72.5	6,750	64.75	6,650
Burning.	T_{18}	54	3,800	68	3,400	61	3,600
	T_{19}	61	4,700	93	6,900	77	5,800
	T_{20}	82	5,300	102	5,000	92	5,150
	T_{21}	60	3,900	61	2,900	60.5	3,400
	Mean	64.25	4,425	81	4,550	72.6	4,487

Table II. Comparative Hum-Extinguishing Resistances for 12 Good and 12 Defective Transmitters.

The pitch of the tone when enfeebled almost to extinction by extra resistance, in either the primary or secondary circuit, was always close to the mean frequency of 825~.

The amount of either the primary or secondary extinguishing resistance was found to depend upon the adjustment and operative condition of the transmitter, keeping the receiver, tube-length and all other conditions unaltered. This led to a trial of this method as a practical test of microphone transmitters.

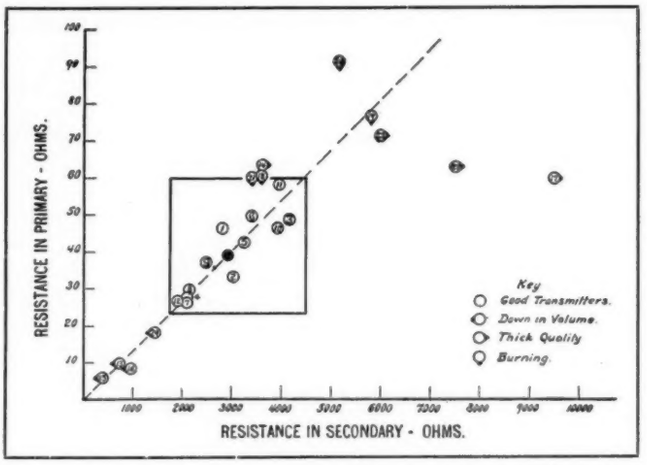


Fig. 7. Target Diagram of Transmitter Tests by the Method of Hum-Extinguishing Extra Resistance.

Observation Series 5a. Test of Transmitter by Hum-extinguishing Resistances.—A number of transmitters, some good and others imperfect, were tested under the conditions above outlined. These transmitters were kindly loaned for this purpose by the Western Electric Company. Twelve were regular standard instruments that had already satisfactorily passed the factory tests. These were labelled T_1 to T_{12} respectively. Four more were marked defective and "down in volume." They were labelled T_{13}, T_{15}, T_{16} and T_{24}. Four more were marked defective and "thick in quality." These were labelled T_{14}, T_{17}, T_{22} and T_{23}. Yet another four were marked defective and "burning." These were labelled T_{18}, T_{19}, T_{20} and T_{21}. Defective transmitters "down in volume" are recognized as weak. Those which are of "thick quality" are strong but defective in articulation. Those which are "burning" produce slight arcing, at or near the electrodes, under normal conditions of operation.

The results of the tests on these 24 transmitters are given in the accompanying table; where R represents the primary, and r the secondary, extinguishing resistance, when the transmitter was gently tapped. Care was taken that the observer in this test did not know the label number, or reported condition, of the transmitter under trial. It will be seen that with the good transmitters, the mean primary extinguishing resistances were all included between 26.5 and 58.5 ohms, their mean secondary extinguishing resistances being between 1,925 and 4,150 ohms. All of the defective transmitters lay outside these limits, the "down in volume" being low, and the "thick quality" high, in their extinguishing resistances; except two of the "burning" type, which fell within the good secondary extinguishing resistance limits. It would seem, therefore, that this resistance method constitutes a possible practical application of the humming telephone to transmitter testing; except that "burning" transmitters may require a separate test for their detection.

The results recorded in the last two columns of Table II. are presented graphically in the target diagram of Fig. 7. The

*Reprinted from Proceedings American Philosophical Society, Vol. XLVII, 1908. Continued from issue of November 6.

square includes all the good instruments and none of the bad. The mean of the good transmitters is indicated by the solid black circle.

Observation Series 6. Effect of Varying the E.M.F. in the Primary Circuit.—Among so many variables and variations as are displayed in preceding diagrams, it is comforting to find one variable which produced relatively little effect within certain practical limits. Fig. 8 shows the frequencies and primary currents for tube-lengths steadily reduced from 260 to 70 cm., with batteries of 3, 4 and 5 storage cells, respectively, in the primary circuit (6.5, 8.5 and 10.5 volts). The transmitter, induction coil, receiver and transmitter were all as in Figs. 1 to 6. It will be seen that the primary currents have their respective maxima and minima in substantial agreement, the range of variation being naturally greatest for the largest battery, and least for the smallest. The ascending intersections of the frequency line with the mean-frequency line of 825 ~ are the same throughout, and conform to the series $30 + 40m$ cm., in agreement with line *I* of Fig. 2. The breaks in pitch do not all coincide; but the differences in this respect are not great, nor can it be said that the biggest battery always produced the most retarded break. Moreover, excepting perhaps the break at 240 cm., the variations in breaking points are within

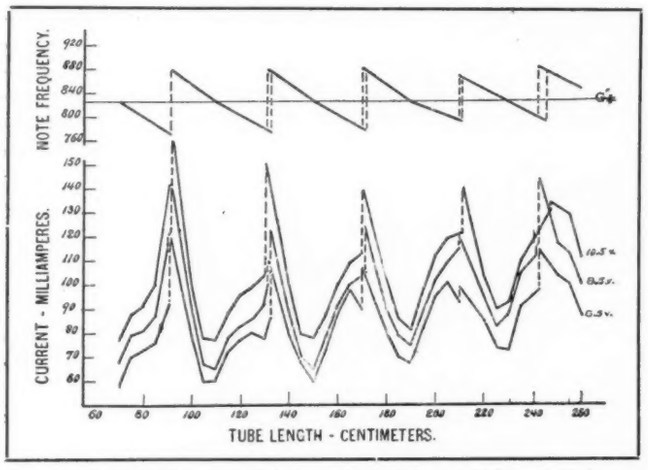


Fig. 8. Frequencies and Primary Currents for Different Primary E. M. F.'s.

the limits of variation obtained in successive series with one and the same battery.

Observation Series 7. Effect of a Condenser in the Secondary Circuit.—It was found that a certain magnitude of condenser capacity inserted in series in the secondary circuit had a marked effect on the behavior of the humming telephone. The results are indicated in Fig. 9, for a tube-length commencing at 270 cm. and steadily reduced to 75 cm., with 8.6 volts in the primary circuit and the same instruments as before. Three sets of curves are given, for 0.2 μf, (microfarad), 0.5 μf, and ∞ μf. (condenser short-circuited), respectively. Referring to the pitch lines, it will be seen that there is not much difference between the cases of ∞ and 0.5 μf. The ascending branches of the zig-zags cut the mean frequency line of G"# at 90, 132.5, 175 and 210 cm. or fairly in conformity with the series $10 + 40m$, as in curve *II* of Fig. 2. With 0.2 μf., however, the intersections with this line are at 100, 145 and 185 cm., or more nearly in conformity with the series $22 + 40m$ cm.; that is, at points displaced about 12 cm. further along the tube. Moreover, the breaks occur at higher frequencies by about 40~.

As regards primary current strengths, the minima in each series occur at substantially the points where the pitch line intersects ascendingly with the G"# line. That is, the minima of ∞ and 0.5 μf. are fairly close together; while those for 0.2 μf. are displaced about 12 cm. further along the tube. Maximum currents occur near breaking points, as usual.

Effects of Mechanical Changes in Instruments.

Observational Series 8. Effects of Modifying the Transmitter.—In order to study the influence of changes in the transmitter upon the humming note, three similar Western Electric transmitters were selected, of standard type and quality, already

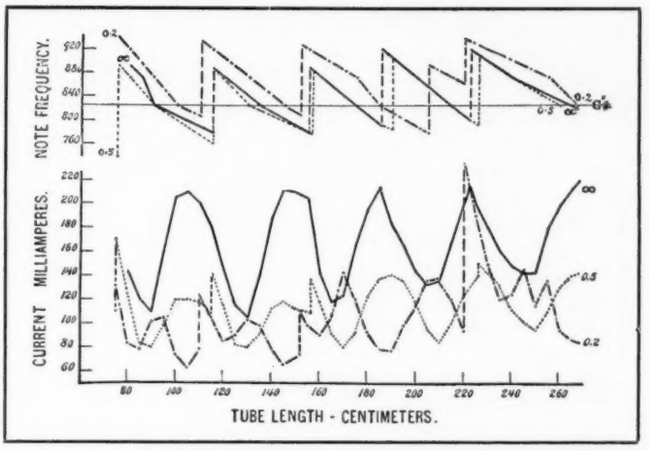


Fig. 9. Frequencies and Primary Current Strengths for Different Condensers in Secondary Circuit.

referred to as T_5, T_8 and T_{11}, in connection with Fig. 7. The receiver, induction-coil, battery and connections were as in previous tests. The comparative results with these three transmitters are shown in Fig. 10, for tube-lengths steadily reduced from 260 to 70 cm. It will be noted that the ascending intersections of the pitch lines all intersect the mean-frequency line of 825 ~ in substantial conformity with the series $30 + 40m$, or in accordance with curve *I* of Fig. 2. The breaking points do not agree, No. 8 always breaking last at a higher pitch, No. 5 next at a medium pitch and No. 11 first at a lower pitch. It may also be noted that in the hum-extinguishing resistance-test of these three transmitters, as given in Table II., and in Fig. 7, their order of succession was the same.

The test indicates, therefore, that different standard transmitters in normal adjustment do not alter the mean-frequency tube-lengths; but that variations in breaking lengths may be expected within certain limits.

A further test was made of the effect of modifying the transmitter, by selecting for experiment a particular Western Elec-

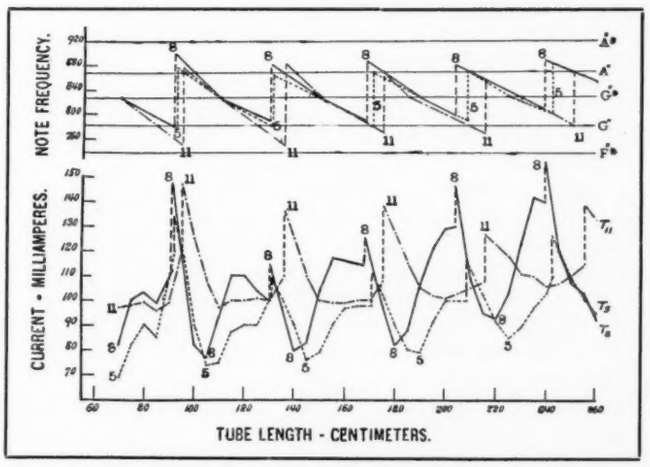


Fig. 10. Comparative Behavior of Three Regular Standard Transmitters with Reduced Tube-Lengths.

tric Co.'s standard type of transmitter which had been used in the laboratory for some years, and was not in the best adjustment. A test was made with this instrument (using the same receiver, coil, battery and connections as in preceding tests), first without any extra load on its diaphragm, second with a load,

and third with the load removed. The load consisted of a small brass disk 1.5 cm. (0.59 in.) in diameter, and 0.2 cm. (0.079 in.) thick, clamped at its center between the two small nuts at the center of the external surface of the diaphragm. This added a mass of 2.7 gm. to the vibrating system of the transmitter. The results are seen in Fig. 11. Curves 1 and 3 represent the be-

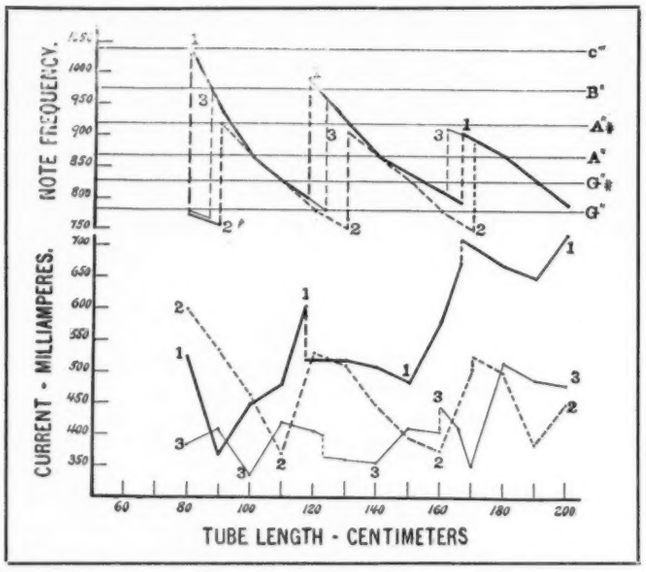


Fig. 11. Test of a Transmitter with its Diaphragm Loaded and Unloaded.

havior of the system unloaded, before and after loading respectively, the tube-length being steadily diminished from 200 to 80 cm. Curves 2 represent the corresponding behavior when the diaphragm was loaded. The primary currents were all unusually large, probably owing to the imperfect adjustment of the transmitter.

It will be observed that the loading did not appreciably alter the ascending intersections of the pitch lines with the G‴# mean-frequency line, which occur in conformity with the series $20 + 40m$ cm. The loading seems to have somewhat lowered the range of pitch as a whole; or to have modified the conditions at breaking, without materially affecting the conditions at mean-frequency (825 ~).

A number of trials with further modifications of the transmitter diaphragm substantiated the above stated results. In one case, a new experimental diaphragm of tinned sheet iron, 0.38 mm. thick (0.015 in.) with parallel and opposite symmetrical sectors sliced off, was substituted for the regular diaphragm in the test transmitter. The primary current strength during activity was thereby increased; but the G‴# tube-lengths remained substantially unchanged at $30 + 40m$ cm. Adding loads, altering the damping-spring pressure, or varying the other mechanical adjustments of the transmitter produced either complete silence; or else the usual G‴#, at $30 + 40m$ cm.

The tests showed that modifying the transmitter alters the range and limits of pitch variation, as well as the primary current strengths; but does not sensibly alter the tube-lengths for mean-frequency.

Observation Series 9. Effect of Altering the Receiver.—In order to determine the influence of the telephone receiver diaphragm on the hum, three special receiver diaphragms were made up, each of soft transformer steel, 0.355 mm. (0.014 in.) thick, and 5.5 cm. (2.16 in.) in diameter, labeled D_1, D_2 and D_3 respectively. D_1 was left circular, D_2 and D_3 had symmetrical sectors cut from opposite sides, reducing their width to 4 cm. (1.57 in.) and 3 cm. (1.18 in.) respectively. In clamping these strip diaphragms in front of the bipolar magnet of the standard receiver, their angular position did not appear to affect the system appreciably.

The results obtained with these three diaphragms are indicated in Fig. 12, for tube-lengths diminished steadily from 270 to 80 cm. It will be seen that the receiver diaphragm influences the hum profoundly. Thus, the circular diaphragm D_1 developed a mean-frequency of 1,100 ~ or c‴′#, judging by the points of minimum primary current, and its pitch zig-zag formed ascending intersections with this line at 95, 125, 155, 185, 215 and 245 cm., approximately, in conformity with the series $5 + 30m$ cm. The sectored diaphragm D_2 developed a mean-frequency of A‴#, at 920 ~, with ascending intersections nearly in conformity with the series $36m$ cm. The narrowest diaphragm D_3 developed a mean-frequency of F‴, at 705 ~, and ascending intersections in substantial conformity with the series $33 + 47m$ cm.

It will be observed that there are double breaks in pitch on zig-zag D_1. This tendency was found to follow irregularity in the diaphragm, or in its mounting. Thus, the ordinary standard diaphragm used in all the preceding tests was observed to develop similar double breaks when the clamping screw-cover was slackened, so as to leave the diaphragm somewhat loosely clamped.

The pitch zig-zag of D_3 shows gaps. These gaps seemed to be due to the enfeebled condition of the electromagnetic vibrating system in the receiver when used with the experimental diaphragm D_3. A very marked case of such gaps is presented in Fig. 13, which indicates the frequencies and currents obtained with a particular single-pole telephone receiver, the remainder of the apparatus being unchanged, and the tube-length being steadily reduced from 165 to 80 cm. The line of mean-frequency is at 1,025 ~, and the ascending intersections with this line are formed at points conforming with the series $28 + 32m$ cm. Only short pieces of the zig-zag were, however, obtainable, and these only with the aid of a condenser in the secondary circuit. The dotted segments *RS* and *TV* were obtained with the receiver terminals reversed, and correspond approximately to ascending intersections of the series $13 + 32m$ cm.

Various other modifications of receiver and receiver diaphragm were tried. Loading the diaphragm with a small central mass lowered the mean humming frequency. By selecting suitable diaphragm dimensions, the mean-frequency of the hum could be varied between wide limits.

Conclusions Directly Derivable from the Experiments.—The

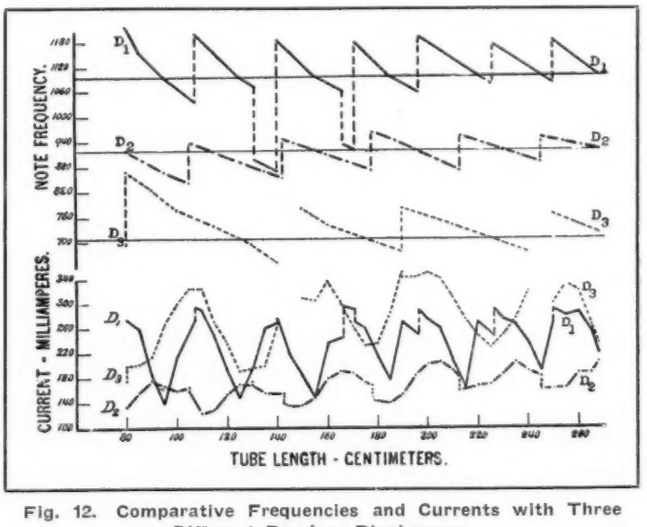


Fig. 12. Comparative Frequencies and Currents with Three Different Receiver Diaphragms.

following more prominent conclusions are indicated by the experiments themselves, independently of any theory:

1. The mean-frequency of the humming-telephone note is determined solely by the receiver diaphragm, and its natural free rate of vibration.

2. The ascending intersections of the frequency zig-zag with

the mean-frequency line will be formed approximately at tube-lengths of $(\frac{3}{4} + m)\ v/n_0$ cm. for one connection, and of $(\frac{1}{4} + m)\ v/n_0$ cm. for the other connection, of the receiver; where v is the velocity of sound in air (33,000 cm. per sec. nearly), n_0 is the mean frequency in cycles per second, and m is any positive integer, within the working range of the tube.

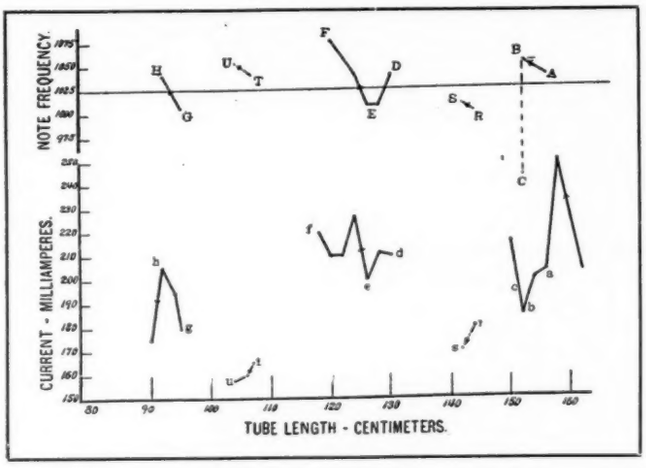


Fig. 13. Discontinuous Frequencies, or Large Gaps in Curves, for Case of Single-Pole Receiver.

The constants ¾ and ¼ may be modified by the presence of condensers, and other circumstances.

3. The range of pitch variation, and the breaking positions, are determined by the transmitter, and by the reinforcing capability of the system. For systems that are weak, either electrically or acoustically, the range of pitch, above or below the mean, will be small.

4. The primary current, as measured by a d. c. instrument, is ordinarily a minimum at the mean frequency, and a maximum at a break.

5. Transmitters may be tested for effectiveness, by measuring their hum-extinguishing resistances in the primary or secondary circuit. The tube-length should be such as to produce mean frequency if one connection of receiver only is used, but should favor both connections equally, if both connections of receiver are used.

(To be continued)

Progress of Oriental Telephony.

The recent award of a contract for telephone equipment to be installed at Pekin, China, brought out some interesting statements on telephonic conditions in the East. The New York *Tribune* says: "In the island of Formosa the telephone has gained considerable ground during the last few years, and even in Corea the Japanese government has recently installed a switchboard, and is now beginning to extend its service. In some tropical places nature, as well as man, seems to conspire against the linemen and foremen of the telephone companies. At such places as Rangoon and Singapore, where 120 inches of rain fall in the course of the year, the moisture had to be especially contended against before the system could be put into practical use, for when a pair of insulated wires become wet the insulation resistance is so reduced that transmission, ringing and all the other operating features of the line are greatly impaired. Moreover, the metal is also corroded by moisture, so that a complete line of specially constructed apparatus had to be brought into use before the telephone could be used in the tropics. Another difficulty was found in India, Burmah and the Straits Settlements, where after the instruments had been installed for a few months, they mysteriously fell to pieces from the walls where they were hung. Investigation proved that the tropical white ant had found a delectable edible in the oak and walnut boxes in which the apparatus was installed and had lunched voraciously on these until the slender skeleton they left fall apart. Here was another difficulty to be overcome, and, after further experimenting it was found that of available materials only teakwood was proof against this insect appetite. In Turkey attempts to introduce the telephone have previously failed because the use of it came beneath the ban of the law on secret communications, which was so rigidly enforced by Abdul Hamid, lest the plans of conspirators might be facilitated by means of telephonic communication. Now, however, Young Turks are rapidly removing the restrictions on trade and civil life which heretofore have barred improvements, and already they are discussing the "advantages of admitting the telephone into the empire."

Telephone Men in A. I. E. E.

The names of the following appear in the November "Proceedings" of the American Institute of Electrical Engineers, as having been elected to associate membership in the Institute: John Richardson Feigel, superintendent of construction, Boone County Telephone Company, Boone, Iowa; Joel Earl Reed, assistant manager, Chicago Telephone Company, Indiana Harbor, Ind.; and Thomas W. Wilkinson, wire chief and superintendent, Auburn Telephone Company, Auburn, Neb.

History of the Automatic Telephone*

The Completed Lorimer System

By Arthur Bessey Smith

General Considerations.—The completed system worked out by the Lorimer Brothers is so different from others in plan and execution, that careful attention must be paid to the description to secure a proper understanding of its operation. Several underlying principles should be recognized at the outset. They may be catalogued as follows:

1. No apparatus at central individual to any line.
2. Power drive for all contacts.
3. Positive control of calling device at substation by central office apparatus.
4. The multiple wiper principle, which will be explained.
5. The finder switch principle.

The unit is an assembly of apparatus designed to serve 100 lines, and is illustrated by Fig. 139. It is divided into a number of groups called "divisions" (5 represented) each division corresponding to a cord circuit of a manual board.

The parts which make up one division are arranged in a vertical column, 4, 5, 6, 7, 8 and 9. They constitute a train of apparatus reaching from the calling to the called line. When a call comes in the action is very similar to that of a manual board. Like the answering plug, the primary connector, 4, hunts up the calling line and connects it. Then the intermediate apparatus receives the number. Final connection to the called line is completed by the secondary connector 9, which acts like a calling plug.

*Concluded from previous issues.

It is evident that the number of "divisions" will be fixed solely by the amount of traffic. If the number of calls increases, more divisions can be added.

The primary connector might be called a finder switch, since it finds the calling line. No two primary connectors in a 100-unit can act at the same instant, as they are controlled by the division starter, 12.

The rotary switch, 5, controls the switching and rearranging of circuits during the progress of the call, and is the general utility member. It gathers to itself the functions of all the side-switches in the Strowger system besides other duties peculiar to the Lorimer mode of working. It comprises the greatest complexity of the system, the rest being very simple. If the place and work of the rotary switch are mastered, the rest of the system will be easily understood.

The signal transmitter controller, 6, has the main duty of regulating the movements of the substation apparatus. Without its action the number set up by the subscriber will not be sent into the office. The signal transmitter controller also has to do with some of the signaling and talking circuits.

Mounted on the rotary switch is the thousands register, a device for selecting the desired thousand group. It does

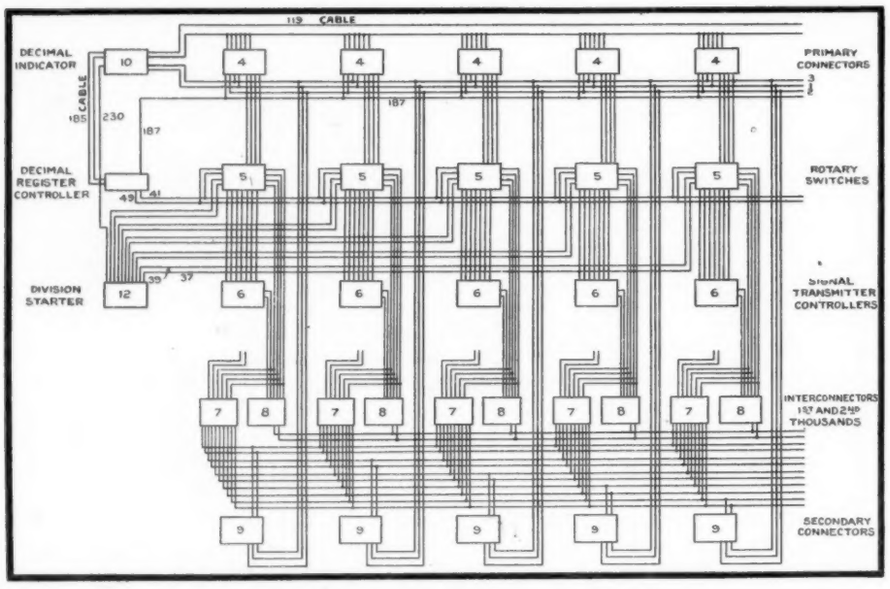


Fig. 139.—Relation of Switches in 100 Line Unit.

this by picking up either interconnector 7 or 8, according as the called number is in the first or second thousand. It is apparent that each division of apparatus will have to be equipped with as many interconnectors as there are thousands in the system.

The interconnector (7 or 8) has the duty of selecting the desired hundred group and then automatically picking out a non-busy secondary connector in that group. The interconnector has the function of a "selector switch" in other systems.

The secondary connector, 9, picks out the called line, completing the chain of connections extending from the calling line through the primary connector, rotary switch, signal transmitter controller, interconnector and secondary connector to the called line.

At the left in Fig. 139 are three pieces of apparatus which are common to all divisions of this hundred group; 10 is the decimal indicator, which periodically tests all the lines of the 100 and, if one makes a call, assists in starting the connection; 12 is the division starter, and, true to its name, it starts an idle division to hunting for the calling line.

The decimal register controller, 11, works with the decimal indicator in guiding the wipers or brushes off a primary connector to the terminals of the calling line.

The Cylinder Switch.—This is the basis of most of the apparatus. It consists of a bank of contacts completely circular in form with the contacts projecting inwardly.

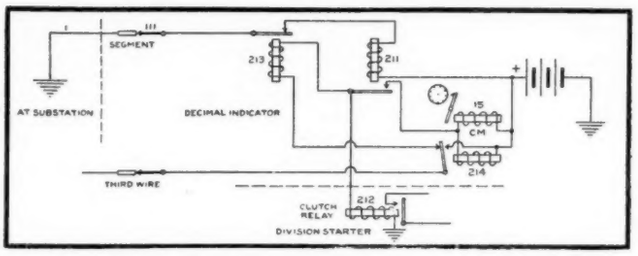


Fig. 140.—Stopping Circuit of the Decimal Indicator.

Vertically through the central space runs a shaft carrying many brushes or wipers, which ride upon these contacts. Usually there are several brushes which bear on the same level or row of contacts. The brush carrying shaft is geared to a constantly rotating power shaft, but the connection is through a clutch operated by a magnet. Normally the magnet is de-energized, the clutch released, and a stop applied to a toothed wheel which locks the brushes in a certain position. When the magnet is energized, the lock is removed and the clutch applied so that the brushes will be rotated by the power shaft.

The Register.—This consists of several wipers bearing on a bank of about ten contacts per level. These wipers have only a rotary motion. They are driven by a spring which is normally under tension. A magnet-controlled escapement allows the spring to drive the wipers step by step, over the contacts of the register bank.

The Primary Connector.—This consists of a cylinder switch with a register mounted on top of the brush carrying member. (See Fig. 144, which is stripped of all but the essential details.) It has a clutch magnet, 19, and a relay, 118. The decimal register, 61, has a magnet, 29, to regulate the escapement motion of the wipers over the contacts.

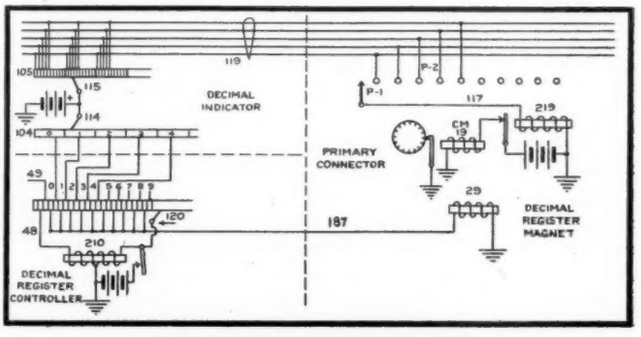


Fig. 141.—Identifying Calling Line.

There are ten sets of brushes (represented by M-1, M-2 and M-3), bearing on subscriber's line terminals. Each set of brushes is wired to a set of contacts on the regis-

ter. Moreover, each set of cylinder brushes can move over a certain ten sets of bank contacts. For instance, a certain set of three brushes will be able to move over the bank contacts of lines 0 to 9 inclusive, another set will move

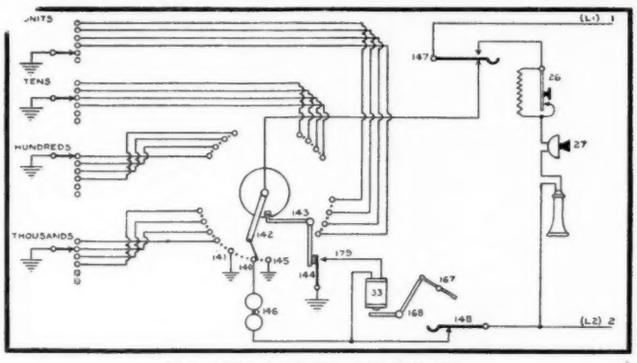


Fig. 142.—Lorimer Sub-Station.

over 10 to 19, another over 20 to 29, etc. Hence if we desire to connect with line 45 we must first move the register to connect us with that set of cylinder brushes presiding over 40 to 49, then move all the brushes six notches. Our selecting set of brushes will now be resting on 45. Other sets will be on 5, 15, 25, etc., but as the register has not connected with them no harm is done. This relation is known as the "Multiple wiper" principle and is used throughout the Lorimer system.

The Decimal Indicator.—This consists of four stationary commutators as thoroughly built as those used on motors and dynamos. Each commutator has a revolving brush which is maintained in motion day and night by a motor or other suitable power. Commutator 101 (Fig. 143), contains 100 segments, to each of which is connected the No. 1 wire of some subscriber in the 100 group. Brush 111 revolves continually over these segments hunting a calling line. When a line initiates a call this brush will stop on the segment belonging to that line, and cause an idle primary connector to hunt up the line desiring connection.

Commutator 106 has the duty of placing a busy or guarding potential on the third wire, 3, of the calling line to safeguard it against being called by another. Commutators 104 and 105 determine the identity of the calling line and will be described in detail.

Subscriber's Telephone.—This conosists of a common battery talking set of any desired pattern (typified by a

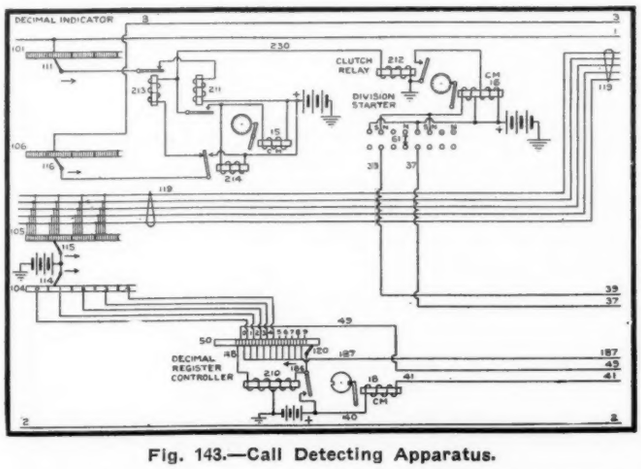


Fig. 143.—Call Detecting Apparatus.

transmitter and receiver, Fig. 142), in addition ot the calling device or "Signal transmitter." A brush carrying arm, 142, is arranged to travel over a circle of contact pins, every alternate one of which is dead. Normally it rests on contact 140, connecting the bell, 146, to the line. The end of a spiral clock spring is attached to the arm 142. The other end is attached to a lever by means of which the spring 33 controls the pawl, 168, so that for every complete cycle train of gears ending in a rotary escapement 167. Magnet can be wound up. The rotation of arm 142 is regulated by a or motion of the armature to and fro the escapement will not allow the brush, 142, to advance from one contact to the next.

The contact 144-179, is closed by the act of pulling down the lever which winds up the spring. The same act advances brush, 142, to contact, 141, but further motion is prevented by escapement, 167.

At the left in Fig. 142 are shown four rows of contacts. There are ten contacts in each row. Each row represents one of the digits of the called number. A brush is adapted to be used over each row, placing a ground on any desired contact. It is these which the subscriber adjusts in setting up the number of the line with which he wishes to talk.

The hook spring has two main springs, 147 and 148, mechanically connected together. The lever of the hook switch is locked down during the call except when brush, 142, has completed its work.

Process of Making a Call.—The subscriber first sets up the number by sliding or rotating the brushes, 171, to the

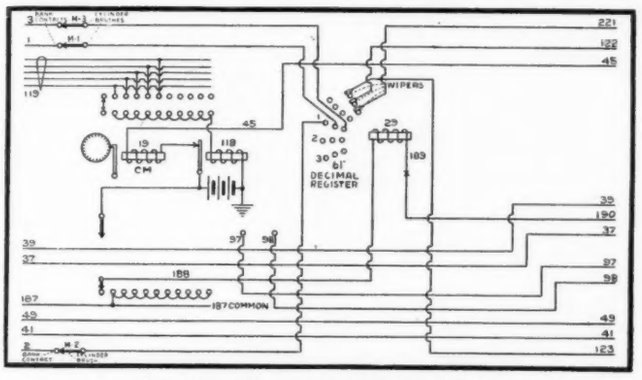


Fig. 144.—Primary Connector Circuit.

proper digits corresponding to thousands, hundreds, tens and units, respectively. He then pulls the starting lever all the way down, and thus winds the spring and advances brush, 142, to contact, 141, and locks the hook-switch down.

This places a ground on line 1, which causes the constantly rotating brushes of the decimal indicator at "Central" to stop on the segment of the calling line. The stopping circuit is given in Fig. 140, all non-essentials being omitted.

When brush 111 strikes the grounded segment, relay, 211, energizes. This closes a circuit through the clutch magnet 15, which stops the revolving parts. Relay 214, in parallel with the clutch magnet, also pulls up, putting positive battery on the third wire of the calling subscriber's line, this being the busy or guarding potential.

It will be noted that negative battery is connected to earth, contrary to the usual custom, although this reversal of polarity has nothing to do with the normal operation of the system.

The clutch relay, 212, of the division starter (in series with 15 and 214) also pulls up, thereby causing the division starter to move and act on an idle division. This action comes about by brush 61 of the division starter (Fig. 143) sending an impulse from positive battery over wire 37 to clutch magnet 17 of the rotary switch (Fig. 145) moving the cylinder brushes of the latter from their normal *N* at top of drawing to the first I position.*

Identifying Calling Line.—In Fig. 141 the scheme of identification is given most simply. A cable, 119, of ten wires runs from commutator 105 to each primary connector. The wires are multipled to a certain row in each cylinder. The segments, 105, of the decimal indicator are divided into ten groups of ten each, and the wires of cable 119 multipled as shown. These are to indicate the units. Brush 115, bearing positive battery, has stopped on a segment corresponding to the units digit of the calling line. Cylinder brush *P*-1 of the primary connector is in line with the regular brushes. As they revolve, due to clutch magnet 19 being energized, *P*-1 will in course of time strike the contact made live by brush 115 of the decimal indicator. This causes relay 219 to pull up, cutting off clutch magnet 19 stopping the cylinder brushes on the units digit of the calling line.

Commutator 104 is divided into ten large segments, each occupying the space of ten segments of 105, with which they are in exact line. Brush 114, carrying battery, has stopped on that segment corresponding to the tens digit of the calling line, and therefore makes live a certain segment of the decimal register controller. Its brush, 120, has been started on its rotation; as it passes over the segment nothing happens until it strikes the segment made live by brush 114. This energizes relay 210, which at once locks up with current through its own contact.

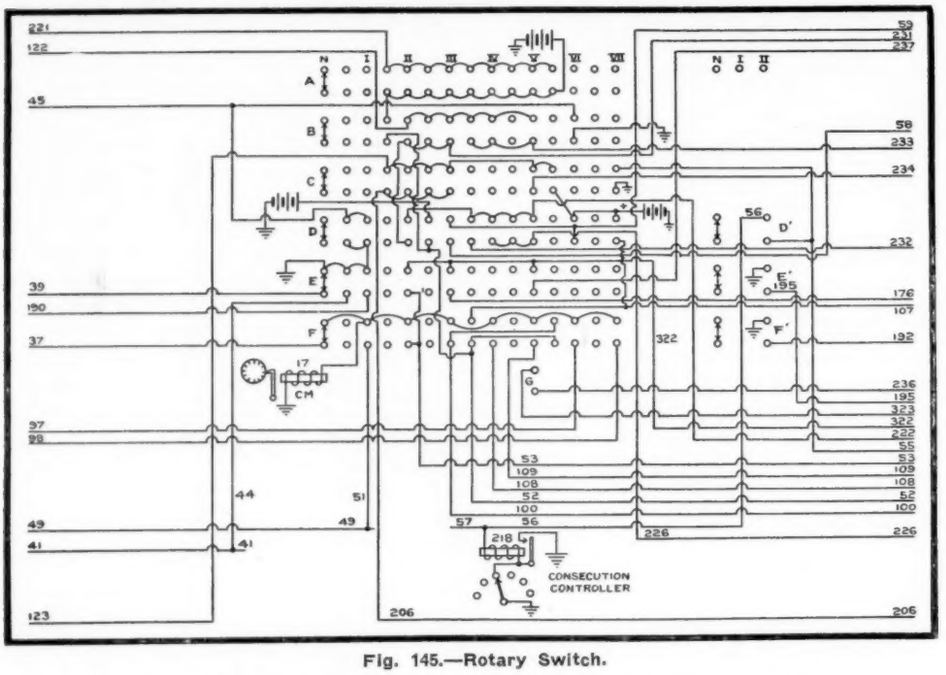


Fig. 145.—Rotary Switch.

The rotary switch bank contacts are shown as if the inside cylindrical surface were rolled out flat, each circle representing a contact. The double pointed arrows indicate brushes which bridge together two rows of contacts. The rotary switch by this motion starts the primary connector cylinder brushes by clutch magnet 19 and the decimal register controller by clutch magnet 18.

Brush 120 now carries positive battery potential so that for the rest of its journey it will send impulses over the wire 187 to the decimal register magnate 29 on the primary connector. This advances the register brushes to connection with that set of cylinder brushes which represent the tens digit of the calling line. When contact 48 of the decimal register controller is reached brush 120 puts both windings of relay 210 in parallel, so that they neutralize each other and the armature falls back. Thus by two separate operations carried on at the same time the working wires of the division are carried through and connected to the calling line.

The last act of the decimal register controller energizes clutch magnet 17 of the rotary switch (wire 49, 51 contact F1 Figs. 143, 144 and 145), sending it on to its second top, position II.

Receiving Signals.—This motion of the rotary switch shifts the connection and starts the signal transmitter controller to receiving the first two digits, thousands and hundreds. It is here that the peculiarity of the Lorimer method of transmitting signals becomes evident. For the purpose of making the positive control of the sub-station apparatus more clear Fig. 149 has been prepared. At the sub-station, of the contact pins over which brush 142 moves, only a portion are shown, and only one of the four digits indicating brushes, *G*. At "Central" that part of the signal trans-

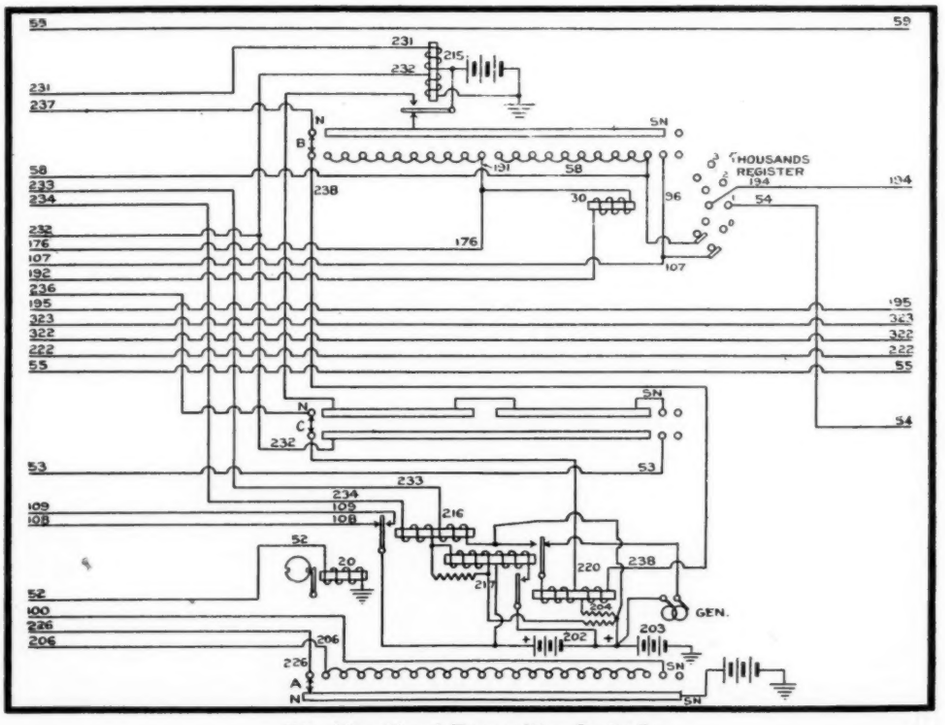


Fig. 146.—Signal Transmitter Controller.

mitter controller concerned is represented by three wipers, *A*, *B* and *C* and relay 215. The escapement magnet at the right may be any of those used to advance wipers corresponding to any digit of the called number.

Wipers *A*, *B C* are attached to the same shaft, and move exactly together. *A* transmits a series of impulses over line L-2 to escapement magnet wiper 33, the latter advancing arm 142 step by step over the contact pins. Wiper *B* sends a similar series of impulses to the escapement magnet in the exchange, setting forward the wipers which it controls. Wiper *B* strikes each of its contacts just a little after *A* has touched its own corresponding contact.

When the signal transmitter controller, at the proper time, has been started, wiper *A*, acting over line *L*-2 and magnet 33 steps arm 142 over the contacts at the substation. Simultaneously the escapement magnet at "Central" has been stepping its own mechanism along by impulses received from *B*. In course of time arm 142 strikes the pin grounded by brush *G*. At once relay 215 is energized, cutting off battery from the escapement magnet at "Central." It and its mchanism are therefore stopped at the positoin indicated by the position of brush *G* of the substation. Relay 215 is locked up by its front contact and wiper *C*. However, when the latter reaches the end of its continuous segment the locking circuit is broken and the whole arrangement of circuits is changed.

Referring again to the main series of detail circuits, (Fig. 146 in particular) the brushes of the signal transmitter controller make their revolution in accordance with the following code:

First—From normal *N* to subnormal *SN* receiving thousands and hundreds digits.

Second—From subnormal *SN* to subnormal, a complete revolution, to receive tens and units digits.

Third.—From *SN* to *N* a short step connecting up the talking circuit.

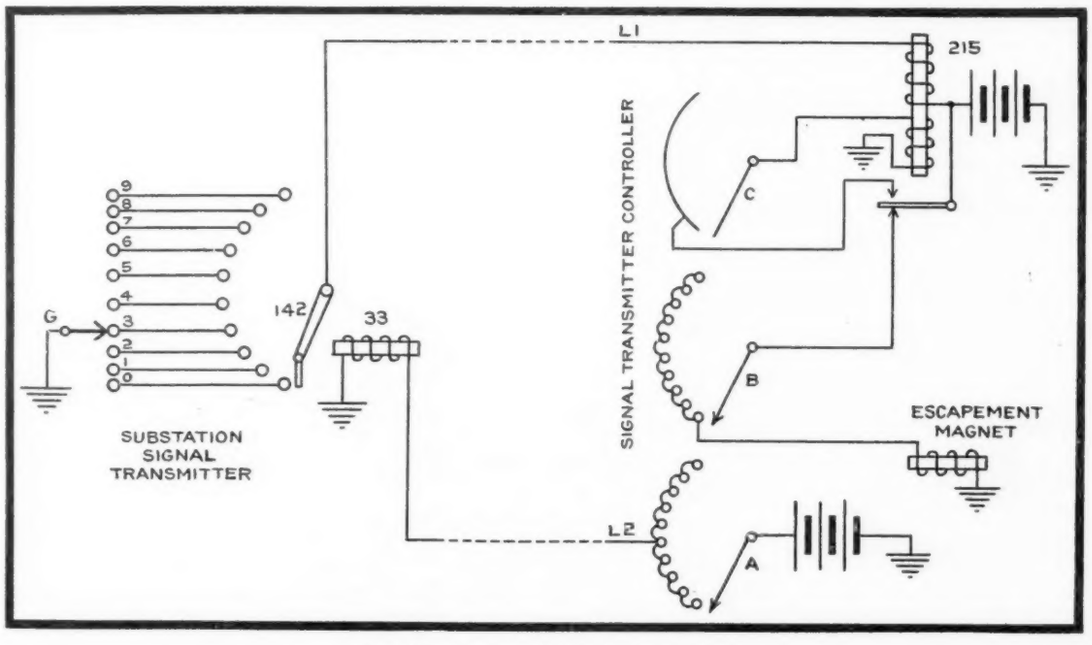


Fig. 149.—Control of Signal Transmitter.

This action is secured by having a notched disc geared to the cylinder brush shaft, so that the disc will make one revolution while the cylinder brushes make two. In the edge of the disc are cut notches so that the dog on the clutch lever will stop the brushes at the positions indicated.

Automatic Trunking.—The proper thousand and hundred having been selected, the next step is the picking out of an idle secondary connector in the called group. An idle condition is indicated by a ground on wire 224, (Fig. 147), while if busy that wire will be alive with positive battery.

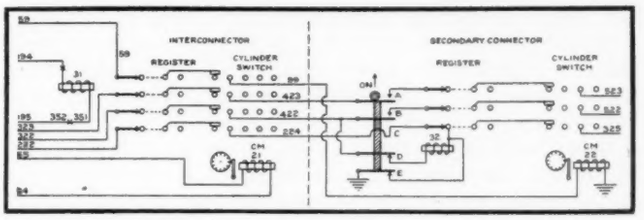


Fig. 147.—Interconnector and Secondary Connector.

When relay 215 fell back from its last work it started the cylinder brushes of the interconnector over the following circuit (Fig. 146): *SN* of *B* wiper, wire 96, outside brush of thousands register, wire 54, clutch magnet 21, (Fig. 147) wire 55 contact D of rotary switch, (Fig. 145) wire 56, relay 218, to consecution controller and ground. The consecution controller is a constantly rotating wiper which is intended to prevent two interconnectors from seizing the same instant. It does this by giving ground to each in succession so that one will always be a little in the lead of the other.

As the cylinder brushes of the interconnector rotate to find a non-busy secondary connector, a testing circuit in the former tries each trunk passed. This testing circuit is as follows: Positive battery upper coil of relay 215, (Fig. 146) wire 231, contact D-II of rotary switch wire 222 to inner brush of register on interconnector (Fig. 147), thence to bottom cylinder brush. When this brush strikes the first idle trunk, the ground at *E* of the secondary connector energizes relay 215 of the signal transmitter controller (Fig. 146) breaking its back contact and releasing the clutch magnet 21 of the interconnector (Fig. 147), thereby stopping the cylinder brushes. The front contact of 215 starts the rotary switch from position 11 to 111. This motion of the rotary switch starts the signal transmitter controller to receiving tens and units digits, setting the tens register and cylinder brushes of the secondary connector over circuits which are easily traced.

The cylinder brushes of the secondary connector are now resting on the terminals of the called line.

Busy Test of Called Line.—The condition which indicates that the called line is busy is positive battery on the private contact or third wire (325, Fig. 147) while a ground or open indicates that the line is disengaged.

While the rotary switch is moving from position III to position IV, it makes a momentary contact (at *D*) which closes the testing circuit to determine whether the called line is busy or free. This circuit is as follows: ground, lower coil relay 215, wire 232, rotary switch D-III½, wire 222 through the interconnector wipers, wire 224, to the private wiper of the secondary connector.

At the same instant that the above test circuit is closed, the rotary switch also closes a circuit to energize the clutch magnet, 20, of the signal transmitter controller. This circuit involves the back contact of relay 215.

Now, if the called line is busy, the test circuit mentioned above will cause the relay 215 to pull up, preventing the signal transmitter controller from moving. This keeps the called line clear of connections. But if the called line is free, the relay 215 will not be energized and the signal transmitter controller will be moved from position *SN* a short step to position *N*.

In this position the signal transmitter controller puts positive battery on the private wiper of the secondary connector, to protect the called line. It also makes the necessary connections from the repeating coil and battery to the line brushes resting on the called line to feed battery current for talking.

Ringing and Talking.—The calling subscriber now lifts his receiver from the hook, thereby de-energizing relay 216, which has been held up over line 1 and the ground at the substation. As relay 216 falls back it gives positive battery to the clutch magnet 17 of the rotary switch (Fig. 145) moving the latter to position V.

The rotary switch is now in the talking position and the two telephones are connected over a circuit which is shown, simplified, in Fig. 148.

The common battery talking set of the calling station is fed with current through relays 216 and 217. The former

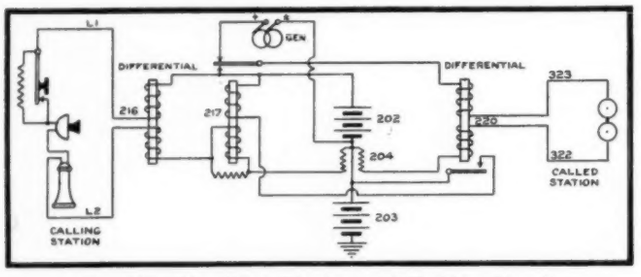


Fig. 148.—Simplified Ringing and Talking Circuit.

is differential, with windings opposing so that it offers little opposition to talking current. The winding of relay 217 which is used is shunted with non-inductive resistance for the same purpose. Relay 216 is solely for release purposes. Relay 217 is the ringing relay. The calling subscriber, with his receiver at his ear, presses the ringing button. This inserts a high resistance in the line, so that relay 217 falls back. This projects ringing current on the called line. It will be observed that it must flow through the called half of the repeating coil. This induces a flutter in the calling subscriber's receiver, which is his indication of a successful connection. If the line had been busy, the circuit of Fig. 148 would not have been established, and on attempting to ring no flutter would result, which would indicate a busy line. When the called subscriber answers, conversation is carried on by the well-known Hayes system of common battery transmission. Relay 220 in the called loop is differentially wound with opposing coils and offers little impedance. It is to prevent the possibility of ringing on a subscriber who is just initiating a call.

Though Figs. 146 and 148 show but two windings in the repeating coil, in practice four are used, this being necessary to secure a quiet line. In fact, it has been proposed to use the condenser-retardation system as installed by newer all Independent telephone companies in manually operated boards.

Release.—When the calling subscriber hangs up it restores the ground on line 1, energizing one coil of relay 216. On pulling up it energizes the clutch magnet 17 of the rotary switch, moving it to position VI. By a neatly arranged series of inter-actions between the rotary switch and the signal transmitter controller, all switches are now automatically rotated forward to their normal positions. The registers are each reset, being forced back to zero by a lug which is engaged by the escapement sector as the register moves around bodily with the cylinder brushes.

Summary.—In conclusion, the following facts may be noted regarding the Lorimer system:

1. It is designed along lines of rigid control, there being no freely moving dial nor fast and slow acting relays.

2. The sub-station apparatus is practically "fool-proof," the user being unable to tamper with the apparatus until the selection has been completed.

3. All parts of the apparatus are exceedingly well made. There is nothing flimsy about any of the Lorimer apparatus which I have examined. The mechanical parts are of ample size and finely fitted. The cylinder brushes and register wipers work under sufficient pressure to make contact certain, while the power drive is a means of assuring certainty of action.

4. The electrical complication used to secure the positive control and power drive seems bewildering at first, but as the details are studied, the circuits and combinations seem more simple.

5. The negative busy signal seems awkward at first, but should not prove a serious objection. In fact, it might be considered an advantage to have the user "hear" the ringing current on its way to the bell, according to a plan which is in successful use in some places.

6. The idea of reducing central office investment to a traffic basis is a good one. It enables a reduction in first cost, if the connecting apparatus be simple enough, and gives greater time efficiency. In a system employing a separate switch for each line, at the busiest hour of the day 90 per cent or more are idle, while for the 24 hours the average will be about 98 per cent idle. In the Lorimer system the only parts of the central office equipment which are individual to each line are the cylinder switch contacts in primary and secondary connectors and the segments of the decimal indicator.

7. While the user is setting up the number on his signal transmitter, or calling device, and pulling the lever which sends the preliminary impulse, the central office apparatus has done nothing for his call. While the switches are taking care of his call the user must wait, if even for a short time. This is an inevitable result of the absolutely controlled feature mentioned under (1). A free dial allows the switches to be working while the dial is rotating back, so that when the user gets through with his manipulations the connection has been completed. There is no wait. However, the actual difference in seconds is not great.

8. As illustrated, no automatic selection of an idle trunk to a thousand group is shown. This would require as many interconnectors in each division as there are thousands in the system. In a 10,000 system, with full 10 per cent switching, this would mean 10,000 interconnectors, alone. It has been proposed to use another interconnector to avoid this trouble.

The Lorimer system is being used in exchanges serving the public at Peterboro and Brantford, Canada, where it is giving excellent satisfaction.

Government Transfers Work of Forest Products Investigation.

Preparations have been completed for the transfer of all the government's forest products work to Madison, Wisconsin, where the U. S. Forest Service Products Laboratory will be located, and to Chicago where the headquarters of the office of Wood Utilization will be established.

The new Forest Products Laboratory being erected at Madison by the University of Wisconsin, which will cooperate with the government in its forest products work is now in the course of construction. The building is expected to be ready for occupancy upon January 1. In the meanwhile temporary offices will be located at 1610 Adams street, Madison.

On October 1 the Yale timber testing laboratory was discontinued and the Forest Service equipment there shipped to Madison. The laboratory at Washington was discontinued at the same time. The timber testing laboratory at Purdue University will be operated until the middle of December, when it will be discontinued and its equipment shipped to Madison.

The offices having general supervision over all the work of the branch of products will remain temporarily at Washington. W. L. Hall, assistant forester, continues in charge of the branch of products and McGarvey Cline will be director of the Madison laboratory. The work of the laboratory will be assigned to five offices, among which are:

Wood preservation, which will study all problems related to the impregnation of wood with preservatives and other substances.

Wood chemisty, which will handle all work bearing on the chemical utilization of forest products. Wood distillation, paper pulp and other fiber products, chemical analyses of creosotes, turpentines, etc., are the principal lines handled by this office.

Timber tests, which will have charge of all tests to determine the strength and other mechanical properties of different woods.

Technology, which will study the microscopic structure of wood, methods of seasoning and drying it, and other problems of a purely technical character.

The class of work in the laboratory may be separated into three kinds, as follows:

1. The investigation of problems in experimental research.

2. Experimental work in co-operation with commercial plants to verify laboratory experiments on a commercial scale.

3. Co-operation with outside parties for the purpose of assisting them in applying principles and processes of recognized commercial value with which the service is thoroughly familiar.

The supervisory staff of the laboratory is as follows: McGarvey Cline, director; H. S. Bristol, in charge of wood chemistry; H. D. Tiemann, in charge of technology; H. F. Weiss, in charge of wood preservation; Rolf Thelen, in charge of timber tests; W. H. Kempfer, in charge of maintenance.

The work of the office of wood utilization at Chicago will consist of studies of the wood-using industries of various states, the study of woods in manufacture and of the methods of disposing of mill waste, the collection of statistics on the price of lumber at the mill and at the principal distributing markets of the country, and the study of specifications and grading rules. The office will also secure statistics of forest products of importance to the experimental work of the service and the study of the movements of lumber and of the conditions of the principal lumber markets. H. S. Sackett will be in charge of the office of wood utilization.

Legal Matters

Conducted by A. H. McMillan

Herzog Patent Valid.

The Herzog Patent No. 628,464, for an electric signaling apparatus and circuit, used principally to enable guests in hotels, by means of latent signal transmitters in the rooms, to signal the office, has been held valid by the United States Circuit Court for the Southern District of New York. The patent was held to embody a system of by-directional signaling, to a limited extent only, it being possible to signal from the office to a room only when the transmitter in the room is set for a signal to the office; the patent was held not infringed by the system of bi-directional signaling by use of a telephone exchange.

Herzog vs. N. Y. Telephone Co., 172 Fed., 625.

Right of Subscriber to Be Protected Against Calls.

Subscriber A requested us not to allow subscriber B to call him, on the ground that he did not want to talk to B, and that it was an annoyance to be called by B. Subscriber A contends that the telephone company has no right to refuse to call any party asked for.

If subscriber A does not wish subscriber B to be allowed to call him, his remedy is to cease being a subscriber of the telephone company. Under the law of most states, a telephone company is bound to serve all subscribers indiscriminately. If subscriber B requests the telephone company to ring subscriber A, the telephone company is under legal obligation to do so, and would be liable for refusing. When a person becomes a subscriber, he submits himself to the conditions of the telephone business and gives to every other subscriber the same right to call him that he has to call every other subscriber. Subscriber A is under no obligation to talk to subscriber B or any one else who calls him, but he cannot refuse to allow the telephone company to connect his telephone with that of subscriber B So much for the legal aspects of the question.

In its practical phases from the point of view of the telephone company, the question deserves the same answer. It would be highly impracticable in any but the smallest exchange, to watch and guard against a particular subscriber calling another party. Moreover, subscriber B could call subscriber A over any telephone except his own, and the operator would have to recognize his voice. It would therefore be practically impossible for a telephone company to comply with such a request as that made by subscriber B, even though it wished and was under legal obligation to do so.

Duty to Deliver Message.

A rather unusual case of an attempt to make a telephone company pay damages recently arose in Kentucky. One Maxberry, living near Bolton, Muhlenberg County, arranged with one Denton to be called on the telephone in case of the serious illness or death of his sister. Denton got into communication with the company's operator in Bolton, and told her Maxberry's sister was dead, and he wanted Maxberry to come to the telephone. According to the testimony

in behalf of Maxberry, the operator agreed on behalf of the company, to deliver the message if Denton would pay the costs of delivery, amounting to $1.50. The evidence for the company was to the effect that the operator did not know where Maxberry lived and Denton asked her to inquire of people around there. This was done and she informed Denton that Maxberry was in the woods about three miles away. A liveryman in the town was hired to take the message, but on going to the woods and spending an hour and a half in search, could not find Maxberry. In the course of the trial, it appeared that Denton and Maxberry had made an agreement to divide any sum recovered from the company. Judgment was rendered against the company, but reversed by the court of appeals of Kentucky, the court holding some of the instructions of the trial judge to the jury, erroneous. In its decision, the Supreme court held that the agreement between Maxberry and Denton was no defense to the action, although void between themselves, and that the company's full duty would be performed when it had used all reasonable diligence to deliver the message within a reasonable time. A new trial was ordered.

Cumberland Tel. & Tel'g. Co. vs. Maxberry, 121 S. W., 447.

Death of Telephone Lineman Caused by Electric Light Wire.

A telephone lineman, in the employ of the Chicago Telephone Company as foreman, and in charge of a gang of men who were stringing telephone wires on poles, was instantly killed. When injured he was attempting to flip a telephone wire which he held over the lower arm of a pole, and in so doing the wire in his hands looped over the wire of the Commonwealth Electric Company, which was hung to the upper arms of the poles and sagged at that point. The electric company's wire, at the point where it was crossed by the telephone company's wire, was not properly insulated, and it was this situation that caused the lineman's death.

An ordinance of the city of Chicago, by which the electric company was authorized to erect its poles and string its wires at this point, provided that it should keep all its wires properly insulated, and that all overhead wires should be protected by guard wires or other suitable mechanical devices. There were no guard wires or mechanical devices at the place of question.

A judgment of $3,000 for the administratrix of the deceased lineman was affirmed by the Supreme Court of Ill.

Hausler vs. Commonwealth Electric Co., 88 N. E., 561.

Electrical Securities as Investments

In a talk before the Chicago Electric Club on Oct. 27, Mr. George B. Caldwell, manager of the bond department of the American Trust and Savings Bank, mentioned four elements as essential features of a marketable bond on an electrical plant. First, the property must not be overbonded; second, it must have good management; third, it must have a depreciation reserve or sinking fund; and fourth, there must be honest accounting. It is important to remember that the investor seeks security first, income second and convertibility third. This is the case with the securities of all corporations.

In the case of electrical properties, the feeling exists that electricity has not yet been fully developed and that the methods employed for its production and distribution are rapidly changing. It is sometimes objected that electrical apparatus has not become standardized as yet, and that therefore there is additional risk—a sort of double depreciation. But Mr. Caldwell's own observation is that standard apparatus is now to be had for electric light and power and that it furnishes a safe business risk for a 15-year or 20-year bond. But it is important that tests of the durability and productive power of modern electrical plants should be clearly and conservatively determined, and the facts freely published, if securities are to be sold to the public.

Referring to a proper depreciation charge, the speaker noted that this item has been very large, but he remarked that it will grow to be less of a hazard, especially with standard machinery. It is contended nowadays that where a property is kept up to a high state of efficiency a depreciation charge of perhaps 5 per cent or at most 7 per cent, will keep the security good. If this is true, electrical securities are as good as those of any other industrial enterprises and compare favorably with the depreciation account on city real estate. An electrical property costing $250,000 must earn $25,000 a year above operating expenses to care for a 5-per cent depreciation and pay 5 per cent on the money invested. Such an earning power does not, however, justify a bond issue for more than one-half of the investment, and then only where the franchise situation and management are of the best and the public is a ready consumer.

The speaker, in answer to a question from Mr. F. P. Vose, gave an interesting account of the procedure followed when an electrical operating man comes to a banker or bond house to secure funds. The first inquiry is whether the proposition offered is genuine or a fantasy. The physical characteristics of the plant or plants under consideration are considered; also the franchise and management. The banker gets all the facts available and then asks the applicant what he wants so much money for. The latter usually explains that he wants to make large extensions and improvements for the future. Perhaps his ideas are visionary; he may be over-enthusiastic by reason of local pride. It may be necessary to cut out certain things. The applicant is asked: "What have you got as a basis for credit? What is the earning power of the property? What will be its future earning power?" Often the visitor can make only vague answer to these inquiries.

If the conversation goes so far, the terms of the mortgage are next taken up, and what is offered to the applicant may be unsatisfactory to him. Perhaps he will go away and make the round of the bond houses, coming back after a while to resume the negotiation. If the proposition is at all interesting, the banker or dealer in bonds will demand reports on the situation and property from an engineer and an accountant to be nominated by the banker, but to be paid by the applicant for the money. Having received these reports, the banker makes his final decision. If he goes ahead with the bond issue the question of a market comes up. All the banker's deposits could be put out in unmarketable securities, but a due regard for the depositors' money makes this impossible; the securities must be marketable; they must be an element of strength and not of danger. If satisfied on this point the bank will be willing to develop the enterprise for the commissions and profits which it receives from the transaction.

The great question is, Can the bonds be sold? When the question of rehabilitating a small run-down property in a small city comes up, it may be better for the men in charge to go to a large operating company and interest that company in the re-equipment of the property rather than offer bonds on the individual property to a bond house. The question of earnings is only a part of the problem. More important is the situation and management of the property. Troubles and losses in small stations come usually from poor management. Thus the security may be intrinsically good, but the management may

change hands; poor management may ruin a good property. This question of management is vital. The management should be intelligent and tactful. The bank is very sensitive about the character of the investments on which it sells bonds, for its customers must have a complete sense of security in bonds purchased. The bank recommends the securities and must watch the management of the property closely. The question of marketability of electrical securities is going to right itself, but the matter of the security involved must always rest on good judgment.

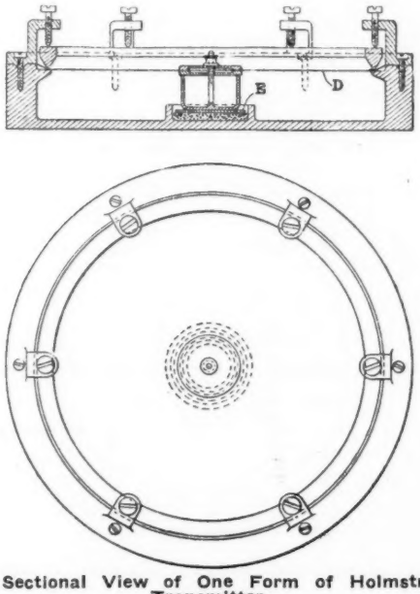
The basis of financing electrical properties of small size must be that the local people have a substantial stock interest. Nobody should borrow all the money he does business on. Real estate loans, for instance, are made on a basis of 40 or 50 per cent of the value of the property. It is inconsistent with conservative finance for a man to attempt to sell an electrical property to the public and still own it himself. Stake your own money with that of the bank. The applicant will receive careful attention if the security offered and the management of the property are right; the bank will take care of the marketability.

The Holmstrom-Egner Long-Distance Transmitter.

When it is considered that in long-distance telephony identically the same line factors must be counted with as in high tension power transmission, that is, capacity, self-induction and resistance, it is remarkable that with a primary telephone circuit using only 0.08 to 0.12 amperes with a tension of three volts, a high tension secondary current is obtained that is able to carry the undulations over a pair of wires 1,000 miles long and produce articulate sounds at the other end.

If the energy in this primary current were increased, and suitable induction coils were used, it is evident that the secondary would be correspondingly increased and the present limit of long-distance telephony could be considerably extended. That this is so has been proven by the new Holmstrom-Egner transmitter, about which notices have lately appeared in European technical journals.

What development this transmitter may bring is hard to

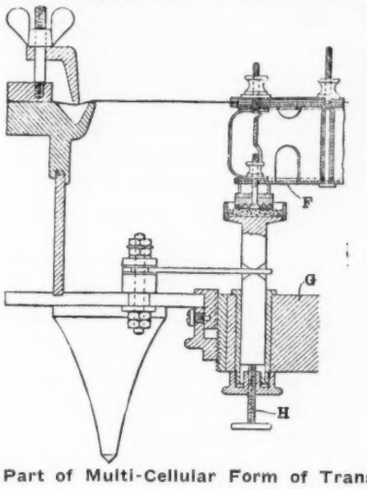


Plan and Sectional View of One Form of Holmstroem-Egner Transmitter.

foretell. It has, however, made it possible to carry on telephone conversation between Stockholm and Paris, a distance of about 1,300 miles, on copper lines that are built with considerably smaller gage wires than those used on the main trunk lines in this country.

The long-distance wires in Europe are run in spiral fashion, instead of being transposed, and are particularly well built and free from induction.

Nevertheless, when this new transmitter was used the line induction was so great that the conversation carried on



View of Part of Multi-Cellular Form of Transmitter.

over the long-distance line was heard over all adjoining lines. In case the transmitter should be developed so that it may be used commercially it would therefore be necessary to have special long-distance lines built for the purpose.

The diaphragm of the transmitter is about seven inches in diameter, and is kept in tension by being stretched hard toward the rim. The carbon electrode is about two inches across. The current used is taken from 110 volt electric light mains, with suitable resistance interposed to cut down the tension. One to six amperes pass through the transmitter when in use.

It is evident that this current will heat the transmitter to a considerable degree, and several devices have been tried to keep the temperature down within safe limits. The latest is to use a large receptacle containing a paraffine composition which melts, and thereby relieves the heat from the active parts.

The inventors have started out on the principle that the energy which, by the transmitter, is transformed into undulations of current, should be as great as possible, in order to increase the transmission power. In other words, the amplitude of the undulations should be large, but there should be no break in the bridge between the electrodes.

Another principle involved, and upon which the increased efficiency is based, is that the main factors are not the conductive parts, but the insulating space between them. To increase the efficiency the endeavor has been to introduce between and around the active conducting parts an insulating substance which concentrates the path of the current and at the same time increases the variation in resistance when the length of the bridges between the electrodes is increased or decreased, according to the vibrations of the diaphragm.

It has been found that the best results are obtained when the case containing the electrodes is hermetically closed, and it was also found that if the air was pumped out from the electrode chamber and different gases allowed to be drawn in in its place, hydrogen gave a remarkable increase in the variation of resistance.

For commercial purposes this would not be practical, and in the later models only air is used.

The problem of transforming the electrical energy into large undulations of current without interruption has now

been solved by using mechanical means, but the details of this new design have not yet been made public.

The diaphragm is so clamped that there can be no doubt that the point of the greatest vibration is exactly at the center, and the front disk of the transmitter (which in this instrument is not formed by the diaphragm itself) is so fixed that its entire surface moves with this maximum amplitude. This arrangement is indicated in Fig. 1, reproduced from a British patent. The method of clamping the diaphragm D with an additional clamping ring is shown, as is also the attachment of the front disk E of the transmitter, which, it is seen, is devised in such a manner that the movement of the ends of the disk is the same as that of the center. As an alternative form, there is described a multiple transmitter in which use is made of a number of transmitter cells fixed at several points around a disk F, as shown in Fig. 2—in which, however, one only of the cells is shown so as not to confuse the sketch. There will thus be absolute synchronism between all the cells. The thin cylinder connecting the disk F to the diaphragm is of steel, and is perforated to save weight and also to assist cooling. The cups containing the carbon granules are supported in such a way that by rotating the ring G the height of them all can be adjusted simultaneously, while the screw H affords a means of adjusting each cell separately. In a previous patent a description is given of a transmitter in which is hermetically sealed the chamber containing the granules and holding hydrogen or a hydrocarbon gas instead of air.

Answers to Queries

Subscribers may submit for answer in this department any questions on practical telephone topics, such as construction, circuits, electrical theory, troubles, operating, traffic, costs, records, business methods, etc.

The answer to each question will be furnished by a man recognized as expert in that particular branch of telephony.

In case the answer cannot be published it will be forwarded by mail. No charge is made for this service, and subscribers are encouraged to consult us freely and frequently.

In every case a thoroughly complete description of local conditions is required to insure a satisfactory answer.

Alternating Current Through Condenser and Bell.

Could you answer this question for me through your paper? A two microfarad condenser is connected in series with a 100-ohm polarized bell having an inductance of 2.8 henrys and a magneto generator capable of developing 90 volts across its terminals with a frequency of 1,200 cycles per minute. How much alternating current will flow through this circuit when cennected?

The complete formula which applies in this case is

$$I = \frac{E}{Z}$$

in which I is the current, E is the voltage and Z is the impedence. Again,

$$Z = \sqrt{R^2 + X^2}$$

in which R is the resistance and X is the reactance. Again,

$$X = 2\pi f L - \frac{1}{2\pi f C}$$

in which $\pi = 3.1416$, f = frequency in cycles per second, L = inductance in henrys, and C = capacity in *farads*. One farad = one million microfarads (M. F.)

First calculate the reactance due to the condenser.

$$f = \frac{1200}{60} = 20 \text{ cycles per second.}$$

$$2\pi f = 2 \times 3.1416 \times 20 = 125.67$$

$$2\pi f C = 125.67 \times .000002 = .00025132$$

$$\frac{1}{2\pi f C} = \frac{1}{.00025132} = 3979 \text{ ohms.}$$

Now calculate the reactance due to the bell coils.

$$L = 2.8 \text{ henrys.}$$

$$2\pi f L = 125.67 \times 2.8 = 351.8.$$

Since the total reactance, X, is the difference of the above quantities, we have

$$X = 2\pi f L - \frac{1}{2\pi f C} = 352 - 3979 = -3627$$

$$R = 100 \text{ ohms}$$

Square R and X and add them

$$R^2 + X^2 = 100^2 + (-3627)^2 = 10000 + 14161128 = 14171129$$

Extract the square root of the above

$$Z = \sqrt{R^2 + X^2} = \sqrt{14171129} = 3764 \text{ ohms}$$

Now calculate the current

$$I = \frac{E}{Z} = \frac{90}{3764} = .0239 \text{ ampere}$$

which is about 24 milliamperes.

The above calculation neglected the extra resistance caused by the core losses, which makes the 100 ohms of copper resistance seem larger. The total of the copper resistance plus the resistance due to core losses is termed "apparent resistance." Consequently we will not get quite as much current through the bell as the above calculation indicates. If the apparent resistance were 200 ohms (double the copper resistance) the impedence, Z, is increased only 4 ohms, making it 3,768 ohms. This will hardly affect the current. The core loss is considerably larger than this, but we can not tell what it will be in the bell mentioned.

Charging By Chemical Rectifier.

In charging a 12 volt storage battery from 110 volts A. C. at 60 cycles through a chemical rectifier, where batteries are used for transformers, in case noise is apparent when charging, how can it be avoided?

In making tests for condition of current in storage battery, is the hydrometer or the voltmeter test the one to use? Which one is the better?

It is best to run the charging leads separate from the service leads directly to the terminals of the battery as shown

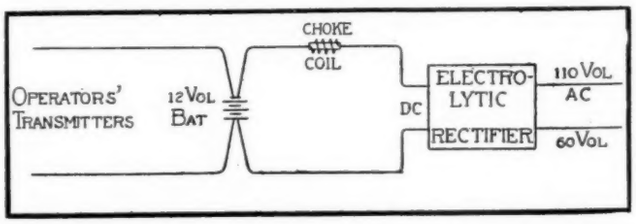


Fig. 1.

in Fig. 1. This will in most cases be sufficient. Do not join the two leads at the battery—attach each separately to the lead terminal.

However, you may find that the capacity of the battery is

small, so that its internal resistance is a little high, you may have to cut in a low resistance choke coil in one charging wire. Any reliable telephone manufacturer can supply you with a coil if you will give him the conditions.

Both the hydrometer and voltmeter should be used in caring for a storage battery. A cell may show a good strong voltage while charging and yet not be on a par with the rest. The specific gravity, as shown by the hydrometer reading, corrected for temperature will reveal this. Or a cell may show too low a voltage due to too weak an electrotyte, and this the hydrometer will clear up. You should not attempt to do without either.

Letters on Practical Subjects

Induction on Twisted Pair Lead.

An interesting case of electric light induction on a telephone circuit was brought out in the following instance, which shows that, while twisted line wire is proof against electric light induction in most cases on local lines, there are conditions under which it is entirely inadequate.

The telephone line in question was made up of 800 ft. of nineteen gage underground cable, 5,200 ft. of nineteen gage aerial cable, and 2,000 ft. of fourteen gage twisted line wire.

A telephone circuit ran within four feet of an arc lamp, and the induction was sufficiently strong to cause complaints of poor service on toll connections.

The electric light circuit was a 2,500-volt sixty-cycle series alternating arc circuit, equipped with 450 watt General electric arc lamps, and was on the opposite side of the street from the telephone circuit except at the point shown in the illustration where the trouble occurred.

The telephone pole is about four feet from the lamp pole, and the telephone lines, which were placed at the top of an extension in order to clear other circuits, drop down the pole to the cross-arm, a distance of about six feet.

The line in question was an ordinary magneto line, terminating in a cut-off jack, so that the drop was out of circuit when a connection is put up.

The cord circuit was the regular magneto circuit with a 500-ohm ring off-drop bridged across it.

The secondary winding of the operator's induction coil was split and grounded in the center.

Practically all of the trunk connections are made through a toll board, and in connection with common battery exchanges.

The trunk circuit has a 500-ohm relay bridged across it, and the toll board cord circuit has a 4 M. F. capacity condenser in series with each side.

The conditions observed were as follows:

While listening on the line at any point, a slight induction was noticed. With the operator in, the induction was increased about 50 per cent.

A connection put up between this line and any other line in the exchange, with the operator off, was "commercial," with only a slight induction noise.

A connection put up on this line through the toll board on any trunk to any office was very noisy on the magneto end, but only slightly noisy on the common battery end, where in most cases the noise was hardly noticeable.

The induction observed was not steady, but fluctuated, being very much more intense at some times than at others.

The trouble, which occurred only when the arc lamps were burning, was more pronounced when the line was connected through a long trunk. Tests which were made showed the line to be perfectly balanced as to capacity, resistance and insulation.

The electric light circuit was also tested, and found to be free from grounds, and in first-class condition.

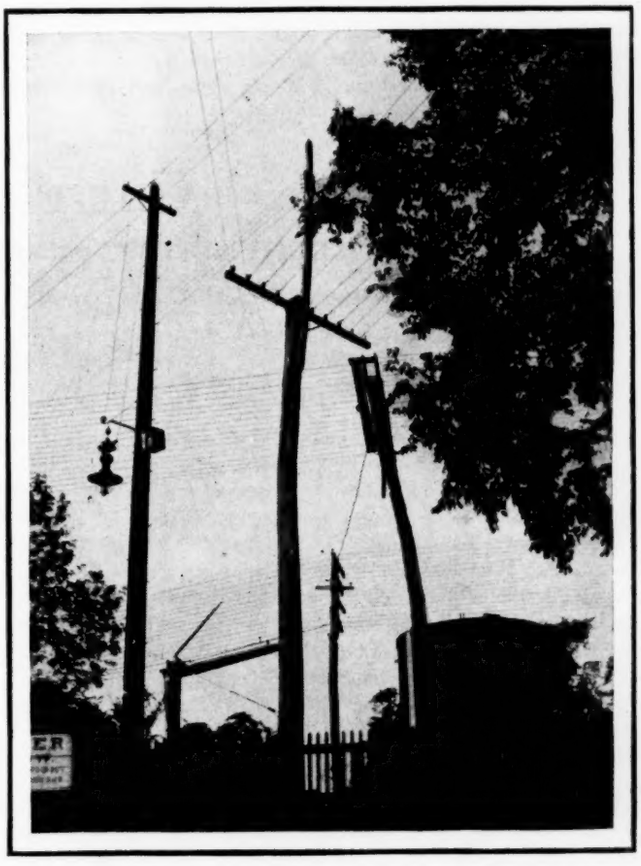
The source of noise on the telephone circuit, however, was located in the twisted pair line, and at the point shown. This was proved, and the trouble cleared by rerouting the line for three sections, thereby clearing the lamp by 100 feet.

In order to do this, it was necessary to cross underneath the electric light line, which was done with a clearance of about 4 ft.

My explanation of the case is this. Assume that both sides of the telephone line act as one side of a condenser, and that the electric light line acts as the other side. The electrostatic fluctuations set up in the arc lamp will charge the telephone line, and, as long as the insulation remains perfect there will be no noise.

The small amount of noise noted on the line when not up on a connection could be accounted for by a very small amount of surface leakage, which would not be detected with ordinary testing instruments.

The increased noise with the operator in on the connection would be caused by the discharge to ground through the operator's receiver and induction coil.



Arc Lamp which Caused Induction on Twisted Pair Telephone Circuit.

The noise when up on a toll board trunk connection would be caused by the discharge through both sides of the trunk, through the condensers in the toll board cord circuit, thence through both sides of the common battery trunk and repeating coil to ground.

The fact that the noise was slight on the common battery end of the connection was due partly to the fact that he discharge was through both sides of the repeating coil

to ground, and partly to the choking effect of the underground cable.

The fluctuation of the noise was due to the feeding of the carbon in the lamp, which caused it to give off stronger waves at times.

As far as I can determine this is the only logical explanation of the condition which existed, and unless I hear of some better theory I shall consider that it is nearly correct.

As stated before all traces of the induction disappeared when the line was shifted so as to avoid the arc lamp.

New York City. A. L. DuBois.

A Dead Line in Arkansas.

It looks as though the people of Arkansas take very little interest in practical subjects. I see letters from Michigan, Minnesota, Iowa, Ohio, Kansas, Louisiana, Kentucky and Texas, but none from Arkansas. Perhaps the people of Arkansas are so advanced in telephony that they think no one needs their assistance! But, rather than have Arkansas not represented I will write again.

A subscriber came into my office very angry, and said if he could not get a telephone that would work by night as well as day he would discontinue. He said that for several nights he could not get any one from six o'clock until nine the next morning. I examined the board and distributing frame, and finally the telephone, but found no trouble. But in going over the line carefully I found the wire crossed with a dead line, going in the same direction. The telephone had been taken out, and the line cut loose from the house and wrapped around the pole. A part was on the ground. The dew at night caused a ground on the line, and the subscriber was unable to ring "Central" until the sun came up enough to dry the ground. I cut the wire loose at the insulator and have had no trouble since.

Des Arc, Ark. W. B. Gullie,
Mgr., Des Arc Telephone Company.

See Uncommon Cases of Trouble.

A lead had in the middle a metallic circuit, with a grounded line, on each side of it. On going out to clear a trouble I found that a quail had flown against one of the side lines with such force as to drive the side wire over across one side of the metallic circuit, so far that it caught its head in the crossed wires, hanging itself and putting the lines out of commission.

A telephone acted queerly, talking, and receiving and giving signals only from about 10 a. m. until 4 p. m. It was perfectly dead the rest of the time, and would not work at all unless the sun was shining. The telephone had been examined two or three times by experts. On examination I found a break in the insulated house wiring. When the sun was far enough around toward the south to warm the wire, its expansion caused the wire to join, thus giving service until the sun had gone down and the wire had become cooled.

Benton City, Mo. F. E. Millar.

Current News

INTERNATIONAL CONVENTION, AUDITORIUM HOTEL, CHICAGO, DEC. 7, 8, 9.

Arkansas Convention, Ft. Smith, Nov. 22 and 23; Michigan Managers', Lansing, Nov. 16 and 17

Michigan Managers' Meeting.

The next semi-annual meeting of the Michigan Independent Telephone Managers' Association will be held at Lansing, Nov. 16 and 17.

The main topic of the meeting will be the getting and handling of long-distance business.

The meeting will be called to order at 2 p. m. at Representative Hall, in the State Capitol. It will be opened with prayer by Rev. Fr. Brancheau. Mayor Bennett will deliver the address of welcome. After a response by the president, and election of officers, the first paper on "Personal Solicitation of Long Distance Business" will be read by Mr. Geo. Hendee, of the Union Telephone Company, Alma. The second paper will be, "The Sale of Coupons," by Frank Heath, special agent of the Citizens' Telephone Company, Grand Rapids.

In the evening a banquet will be held in Assembly Hall on North Washington Avenue.

Arrangements are being made to have several speakers present who will talk on telephone matters, but this will be distinctively the social affair of the convention, as the ladies, operators and managers' wives will attend this convention. A dancing party will be held after the banquet and speech making.

Wednesday forenoon will be devoted strictly to discussion of toll line operation. W. S. Vivian, secretary of the association, has been selected to conduct a school of instruction, and the long-distance operators will have an opportunity to learn how to solve some of the problems of handling long-distance business with despatch. This topic always provokes interesting discussions at the managers' meetings.

As Lansing is quite centrally located and easy of access, a large attendance is expected. For one reason or another Lansing has never been selected before as the meeting place, and now local manager Hughes and the officers of the Citizens Company of Grand Rapids are making a special effort to make it worth while for telephone managers and operators to be present.

Revival of Project for Independent Exchange at Evansville, Indiana.

It is stated on good authority that after the new city administration comes into power on Jan. 1, efforts will be made to get a franchise for an Independent telephone company in Evansville, Ind. Albert W. Funkhouser, attorney for the Independent interests in that city, says plans will be announced in a short time. At the city election held Nov. 2 the present city administration was turned down, and the new council will take up the duties of office on the first of the year. The present council gave the Cumberland Telephone & Telegraph Company a new franchise for forty-five years, which has been harshly criticised by many of the leading citizens of Evansville. The same council refused to give an Independent telephone company a franchise. Business men in many of the southern Indiana towns have been asking Evansville for years to let the Independent lines into Evansville, and the announcement that Evansville will at last throw open her doors to the Independent companies has been met with general rejoicing. The Independent companies in many of the southern Indiana counties are strong, and in many localities lead in the number of telephones and efficiency of service over the Bell company.

Louisiana Independent Company Expanding.

Announcement was made on November 4, at Monroe, La., that the Home Telephone Company is planning to increase its capital stock from $25,000 to $50,000, in accordance with a vote of the stockholders. This increase is made necessary by the constant and rapid expansion of the company's business. It is understood that $15,000 of the $25,000 additional stock has already been subscribed.

Work now under way will, on its completion, give the company about 800 telephones in service, and over 200 miles of toll lines. Its success, under the management of Mr. Chas. F. Speed, has caused the Cumberland company to become considerably excited, and fill local newspapers in this section with a lot of talk about Independent failures, which obviously falls through when the real condition of a live property is known.

Illinois Independents Organize District Toll Clearing House.

Representatives of the Independent telephone companies scattered throughout the district from Kewanee, Ill., to Quincy, and from Peoria to the Mississippi River, met in Galesburg, Ill., on November 6 for the purpose of instituting a Clearing House Association for the companies in that district.

The formation of this Clearing House is the culmination of plans which had been under consideration for some time, the final decision for which came when the trouble arose between Alexis and Monmouth, Ill., over the handling of the Bell messages, and the rates to be charged, at the time when the Monmouth Independent company took over the Bell exchange in that place.

Several discussions pointing out the advantages of a Clearing House Association were offered by men experienced in the matter; among which were the facts that it would be the means of getting an equitable distribution of the earnings of toll lines; and that it would tend to bring about uniform rates.

All the companies represented, either by person or proxy, were in favor of the formation of a Clearing House, many deeming it a necessity for the reasons set forth.

It was decided that, should favorable action be taken by the State association for establishing an Illinois Clearing House, the district Clearing House will merge its interests with it. But should this not materialize, the district Clearing House will be established, and conducted by members for mutual profit and comfort.

First T. P. A. Meeting.

The first of the Technical Publicity Association's monthly meetings for 1909-10 was held Thursday evening, October 14, in its headquarters, 14 Gramercy Park, New York. There was a good attendance. All enjoyed the informal dinner, after which came an interesting program.

The president of the association, Mr. Charles S. Redfield, advertising manager of the Yale and Towne Manufacturing Company, was toastmaster. The only extended address was that of Mr. George French, editor of Advertising and Selling.

Mr. Howard M. Post told of plans for a systematic, analytical study of effectually tracing results from trade paper advertising. The keying method, he said, has proved inadequate. There should be some way of determining the effect of such advertising, declared Mr. Post. At the conclusion of a discussion of this subject in which every point of view was presented, Mr. Post was made chairman of a committee to outline this study work for the association.

"It is about time for advertisers to cease to shy at that word Psychology," said Mr. French. His remarks were an interesting presentation of the psychological and artistic aspect of advertising. His hearers were taken into the field of optics, and shown the effect advertisements have upon the eye of the reader.

"It is well to assume," continued Mr. French, "without any discussion, that every human mind is favorably inclined to receive a suggestion. This is a physiological fact, established and indisputable. There are many fallacious ideas in circulation about suggestion. There is nothing occult about it. It is not even mental, but purely a physical quality of the mind. It is guided by definite well-known, or rather well-ascertained laws. Memories and forgotten knowledge are in the mind, and help it to make its decision."

The illustration Mr. French gave was that of a fork in a road. 'A man must decide," he said, "which way to turn, whether right or left. Once he has made his decision to go to the right, all thoughts and ideas having any connection with the left road are banished from his consciousness.

The illustration Mr. French gave was that of a fork in a road. "A man must decide," he said, "which way chanical, largely psychological. In advertising it is of the first importance.

"You must think of your advertisement as a picture, The eye has to have something to attract it, or a person can't be impressed. The impression is dulled unless there is a distinctive something to attract the eye, like a picture.

"Certain elements or qualities go to make an advertisement attractive. These are the same that lie behind every piece of art, that is, true art. Some of these are form, proportion, balance, harmony, tone, symmetry, perspective, color.. They are easy to get if in planning you have in mind their usefulness.

"The most common form in advertising is the oblong rectangle. This is a rule of proportion. It can't be varied without bad results. Three to five, broadly, are the proportions. This is about the shape of a magazine text page. It is also the proportions of a properly constructed cross. Radiating from the point of intersection of the cross one may work out symmetry, harmony and tone.

"A harmonious tone is almost impossible with the use of half-tone illustrations. Personally, I am very glad to see the renaissance of the line engraving, or the pen and ink sketch, in the work of advertising. It doesn't 'hog' all the attention given to the advertisement.

"One other line of study is well worth reading up a little, and that is optics.

"The power of the eye is extremely limited. It seeks to reject the printed matter we seek to impress upon it. It acts in a seemingly erratic manner in reading. It doesn't travel steadily, but in jerks and jumps. These are known as fixation points. The eye wants to stop; it goes on haltingly, painfully.

"The normal reading line is not over 3½ inches wide. This the eye can take in with five, six or seven fixations. It should be divided up so that the eye can read it easily. Catchlines should be of such a nature that the eye can pick them up without conscious impulse—without any effort of the will. There should be no obstacles. This is of the utmost importance to the advertiser."

After disposing of business matters the association adjourned to meet again in the same place on November 11.

Telephone Company Assists Theatres to Sell Tickets.

The Home Telephone Company of Michigan is receiving considerable attention from the Detroit public because of a recent adoption of a plan which enables subscribers to re-

serve tickets over the wire through a theatrical ticket bureau. The company has furnished an office on the third floor of the Elks Temple, which building adjoins the Temple theater, and which is also in the heart of the downtown theater district.

The company has issued notices to subscribers within a radius of 50 miles stating that any time theater tickets to the different Detroit playhouses are desired, all that is necessary is to call the ticket bureau and make reservations. These reservations are of two kinds, "limited" and "guaranteed." The limited reservations, as secured by the company, will be held in the name of the subscriber at the box office up to 7:30 of the night of the play. The guaranteed reservations are those made with the company by subscribers whose credit is good. The company guarantees payment on the ticket.

Leaks and How to Stop Them.

All over the country public service corporations are realizing that the difference between a small loss and a little profit is represented by the saving which can be effected all along the line on the little items. In a letter to managers of the Postal Telegraph Company, Superintendent W. C. Black, of Denver, touched upon this proposition in such a forcible, helpful way that abstracts of the letter, with minor changes, to make it apply to the telephone business, are presented as follows:

By "leak" is meant anything wasteful, or hurtful, to a business. A loss from any cause is a leak.

There is no business without leaks, and the telephone, business is, unfortunately, not an exception.

The sending of second requests to secure replies to letters or error cards is a *leak.*

The waste of supplies is a *leak.*

The lack of care of the company's property is a *leak.*

The lack of promptness causes leaks.

One of the most dangerous leaks in our business is that caused by heedlessness at the toll circuits, and it is the one *leak* that I will speak of in this letter and ask you to watch carefully.

A customer makes no allowances for failures. Every call lost is a *leak,* the size of which we never know. We have at times lost the entire business of a valued customer because of the fact that one call was not answered.

When toll circuit wires are interrupted, repairs should be made without delay. Urge your linemen to prompt action.

Place only the most attentive operators to handle the toll circuits. Careless ones will not do the work right.

Every lost call from whatever cause is a *leak.*

Remember that circuits are subject to interruptions from unavoidable causes. Neglect and inattention add the avoidable interruptions, but patrons make no allowance for either.

No Change in Ohio Situation.

Since last week's issue of TELEPHONY there have been no important developments in regard to the status of ownership of the controlling interest in some Ohio and Indiana telephone properties represented by James S. Brailey, Jr. While local companies are still interested in this question, the only activity, if there is any, is confined to the efforts of the committee appointed two weeks ago to consider posible action.

Competition Good for Gas Business.

James T. Lynn, of Detroit, Mich., president of the National Gas & Electric Light & Power Co., of Detroit, has made a close study of the economics of public service. In an address before the Michigan Gas Association, of which Mr. Lynn is president, he recently said:

"My reference to competition brings up one of the vital problems that we are called upon to meet. I refer particularly to the competition of the electric light. During the past few years the electric light has made marked progress. Its advent in the field has been of distinct benefit to gas companies, for it has stimulated us to greater efforts. We are happy to say that we have not only held our own, but also have been able to increase our business. Gas engineers who have heretofore confined their energies to development and improved method of manufacture, are now largely devoting their attention to the sales end of the business. Today, as never before, we lean toward economy.

"Every successful business institution practices it. Why shouldn't we?"

Louisville Home Company Acquires Independent Long-Distance Lines.

It is stated that final details have been completed in the big telephone deal at Louisville, Ky., whereby the Louisville Home Telephone Company purchased almost the entire bond issue of the Independent Long Distance Company. This is acknowledged to be one of the largest transactions to be consummated for many months. The actual consideration agreed upon by both sides at a meeting held at the local company's office a short time ago has not been disclosed officially, but it is understood that the amount involved is close to $300,000. The control of the Independent Long Distance Telephone Company now rests in Louisville with the Home Telephone Company. By obtaining control of the Independent lines the local company is now in a fair way to penetrate territory it has been trying to reach for some time in Kentucky and Southern Indiana, where the Independent lines operate.

Conditions in Louisville, by reason of this deal, are now similar to Independent conditions in other cities, and Louisville will profit by reason of securing control of the long-distance lines to be operated in closer connection with large exchanges in the city.

New Plant at Crawfordsville, Ind.

The new exchange building for the Home Telephone Company of Crawfordsville, Ind., has been completed and the work of installing the new system is being pushed rapidly to completion. The building, located on North Water street, is a two-story brick building, everything about the construction being of the very best and thoroughly up-to-date. On the first floor of the building will be located the general offices, operating room, manager's office, and the wire chief's room, containing power board, relay racks, etc. The second floor is fitted up into suites of rooms for rent as offices.

The Home Telephone Company is one of the several live up-to-date Independent companies of that section, and is constantly expanding its system. TELEPHONY is just informed of the purchase of two small systems by the Home company, namely, the Garfield telephone system, Garfield, and the Mace telephone system of Mace. The Garfield system comprises about 100 telephones, and while the system is in fairly good working order, the Home company reports that it will entirely remodel this plant and install a new metallic line system. The consolidation of these lines gives the Home company direct connection with Garfield and Darlington.

The Mace system embraces about 150 telephones.

It is reported by General Manager J. K. Johnston that with the purchase of these two systems, the Home company will install an exchange system at Smartsburg and connect the telephones of the two systems to this new exchange. Likewise a number of trunk lines will be strung from Crawfordsville to Smartsburg to give ample connections for the subscribers.

The Home Telephone Company of Crawfordsville now connects with over 5,000 Independent telephones in Montgomery county, Indiana. The officials have under consideration the purchase of several other small systems operating thereabouts,

and aim to secure complete and thorough connections throughout the state.

The officers of the company are Theodore H. Ristine, president; Dumont M. Peck, vice-president; Charles W. Hymer, secretary; J. K. Johnston, general manager and treasurer.

Oklahoma Company Requests Corporation Commission to Arbitrate Rates.

The Norman Telephone Company, of Norman, Oklahoma, is voluntarily asking the Corporation Commission to assist it in adjusting rates to subscribers. The company is desirous of doing away with certain inequalities and believes that changes can be made more smoothly if backed by the authoritative opinion of the Corporation Commission.

ADVERTISING AND PUBLICITY

Buy and Sell by Telephone.

A page in the latest Philadelphia directory of the Bell Telephone Company of Pennsylvania is given up to a suggestion about "Ordering supplies by telephone." The idea presented is that "the retail merchant's telephone serves not only as a salesman, but also as a purchasing agent.

"When a merchant finds that he is going to run out of a line of goods, he calls up the wholesaler or factory and not only orders a new stock, but comes to an agreement on the proce and the time of delivery.

"The unexpected needs of his customers can be met with the least possible delay.

"If the merchant cannot find what he wants in town, the long distance service brings him into immediate communication with other cities and other markets."

Vermont Independent Uses Publicity Medium.

It would be a good thing if more Independent companies would adopt a regular plan for local publicity such as the Quarterly Bulletin issued every three months in the interest of the Vermont Peoples Telephone Company. This is given up principally to a description of Independent projects of local interest throughout New England. For example, in the present issue there is a little story of general interest—an account of a project originating in Haverhill for a new telephone company to operate in northeastern Massachusetts; statements of the activities of New Hampshire Independents in the vicinity of Franklin; and the announcement of a proposed extension of the Home Telephone Company of Randolph, Vt.

The publishers of this paper are going after the Bell Telephone Company close to its home, publishing articles showing financial weakness of some of the Bell members.

While it is a poor plan to "knock" telephone investments without analysis, and the space might be better given up to discussions of the good features of the Independent telephone business, it would be interesting to see what effect a general adoption of this plan, by local companies, would have upon the policy of the Bell Telephone Company, whose universal practice of distributing in the public press statements intended to injure the credit of Independent companies is well known.

The status of the company issuing the bulletin is set forth therein by a comparison making the following statement:

"Ten years ago the total number of telephones in Orleans County was about 150, all under one company, the New England Telephone and Telegraph Company (Bell) with rates from $24 to $52 per year for limited service.

"Today the Vermont People's Telephone Co. (Independent) have 1,460; the D. L. McGuire Telephone Co. (Independent), 375; the Barton Village Co. (Independent), 75; total, 1,910. Rates at $12 per year for unlimited service.

"The Passumpsic Telephone Co. (Bell) has about 728; the Holland and Morgan Telephone Co. (Bell), about 50; the Greensboro and Glover Telephone Co. (Bell), about 100. Total, 878.

TEN YEARS AGO.

New England Tel. and Tel. Co. (Bell), 150; $24 to $52 unlimited service.

TODAY.

Passumpsic Tel. Co. (Bell), 728; $12 to $18 limited service.

Holland and Morgan Tel. Co. (Bell), 50; $12 to $18 limited service.

Greensboro and Glover Tel. Co. (Bell), 100.

Total Bell, 878.

Vermont People's Tel. Co. (Independent), 1,460; $12 unlimited service.

D. L. McGuire Tel. Co. (Independent), 375; $12 unlimited service.

Barton Village Tel. Co. (Independent), 75; $7.50 to $12 unlimited service.

Total Independent, 1,920.

Total number of telephones in the county, 2,798.

"Taking the figures of the last census, ten years ago, there was one telephone to every 147 inhabitants in Orleans County. *Today there is one telephone to every 8 inhabitants.*

"What has done this? Competition and nothing else. The telephone development could never be attained under monopoly. It would be impossible."

Crossing the Bridge Before They Get to It.

The Bell telephone company figures things out a long way ahead. Some people say its executives at Boston have a plan about like this—buy up Independent plants at strategic points—squeeze out the rest—raise rates—develop. That is, wait until the Independent companies are out of the way, and then take all the business obtainable at high rates.

Local officials in competitive territory find there is some objection raised by the public and the Independent stockholders to the execution of this plan just to please the men who thought it up. They have to go after the business now, or see the other fellow take it. The accompanying illustration shows how the Bell telephone company of Missouri straddles on the "one telephone proposition."

One Telephone is Enough
BUT IS IT?
Do you happen to know why so many business houses are equipped with A PRIVATE BRANCH EXCHANGE? Because the business man is finding out that IT DOESN'T PAY to give a customer the "busy" signal.
How about the people that call YOU?
Let Olive 100 send some one to talk Private Branch Exchange to you?

Head of a Page in the St. Louis Directory of the Bell Telephone Company of Missouri.

Advertising Long Distance on the Norfolk Directory.

The front cover of the directory of the Norfolk (Nebraska) Long Distance Telephone Company, as might be expected by those who know that one of the money making hobbies of general manager W. J. Stadelman is advertising long-distance, carries a map of the surrounding territory, showing that "all lines lead to Norfolk." This map is prominently displayed within the Shield.

Throughout the directory appear a number of advertisements in half-inch spaces at the top and bottom of the pages.

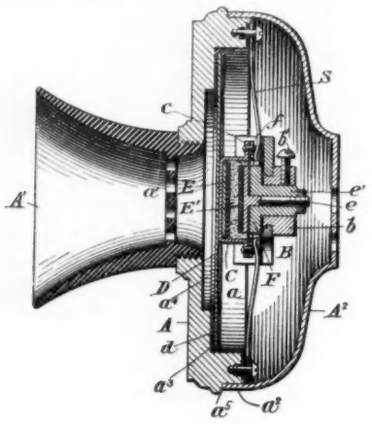
Patented Circuits and Apparatus

By Max W. Zabel

TELEPHONE TRANSMITTER.

William W. Dean, Elyria, O., reissue patent 13,035, Nov. 2, 1909; assigned to Dean Electric Co., Elyria, Ohio.

This transmitter has the ordinary diaphragm *D*, and a cup *C* resting against it, but not fastened thereto, and springs *S* which press the cup against the diaphragm. The front electrode *E* rests in the cup, carbon granules being interposed



between the front electrode and the rear electrode *E*, which rear electrode is fastened in the bridge, as shown in the illustration. It is claimed that this gives the transmitter a very high efficiency.

TELEPHONE LINE TESTING SYSTEM.

Arthur N. Chenoweth, Waterbury, Conn., patent 938,974, Nov. 2, 1909.

This patent is designed to cover means for locating trouble on long-distance telephone lines, and utilizes an intermediate testing station. A selecting or line-controlling device is located at the testing station to control the continuity of the telephone lines. Operating keys are located at the terminal stations which are adapted to be included in circuit with the selecting device, which comprises a rotatable cylinder having a circumferential contact strip upon its surface, together with a depressible contact key adapted to make contact with the contact strip, and at the same time advance the cylinder a predetermined distance, whereby to make contact and close the circuit, likewise advancing the selecting device. There are further indicating means in connection with the cylinder, which indicate the corresponding position of the selecting or line controlling device.

TELEPHONE EXCHANGE.

C. A. Anderson, Salina, and W. Hagstrom, Lindsborg, Kan., patent 938,943, Nov. 2, 1909; two-thirds assigned to the Anderson Electric & Mfg. Co., McPherson, Kan., and one-third assigned to Hagstrom Bros. Mfg. Co., Lindsborg, Kan.

This invention covers a step-by-step signaling system, in which a pair of operating coils have under their control an armature operated in one of two different ways by currents of different electrical character; this armature carrying a pawl which operates a ratchet wheel, and which ratchet wheel is stepped around to the desired station, whereupon a reverse operation of the pawl locks in a desired station. After the conversation is completed, the pawl steps up the wheel to a further or limiting position, whereupon a release is effected of the entire mechanism through the agency of a pin carried upon the ratchet wheel.

APPARATUS AND SYSTEM FOR MEASURING TELEPHONE SERVICE.

S. H. Browne, Pittsburg, Pa., patent 938,039, Oct. 26, 1909, assigned to Am. Telephone & Telegraph Co., New York.

In this patent, an ordinary common battery system is shown, which, however, has an automatic switch at the central office. This automatic switch is designed to pick up an idle cord circuit. In connection with this device, a registering mechanism is attached to the automatic switch, which registering mechanism, however, is not operative until the called subscriber has removed his receiver from the switchhook.

TELEPHONE SYSTEM.

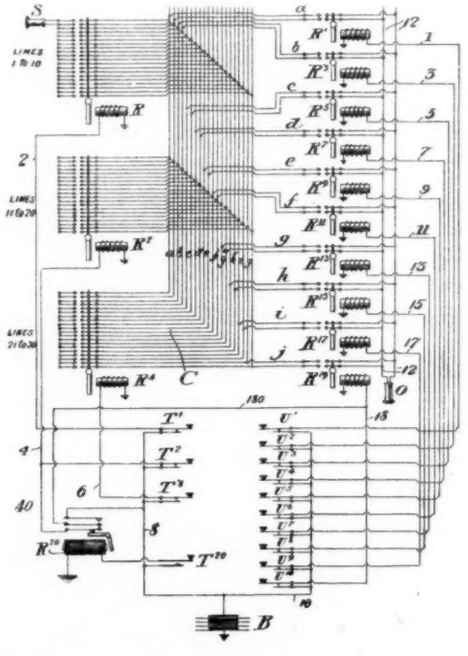
Edward E. Clement, Washington, D. C., patent 939,187, Nov. 2, 1909; assigned to North Electric Company, Cleveland, O.

This patent is similar to patent 939,186, except that instead of covering the apparatus which is used to carry out the features of the patent, this particular patent covers the method which is employed in making these interconnections.

SELECTIVE APPARATUS.

Edward E. Clement, Washington, D. C., patent 939,186, Nov. 2, 1909; assigned to North Electric Co., Cleveland, O.

This system is designed for interconnecting subscribers' lines, and consists in the provision of means whereby a plurality of lines can be satisfactorily interconnected through the use of a less number of relays than the total number of lines



to be connected. In the illustration, for instance, there are thirty such lines in three banks, numbered respectively from 1 to 30, each being a subscriber's line, the receiver *S* being shown to indicate this in connection with one line. An inter-

connection line, 12, is also used, to which the telephone receiver O is connected to show that it is used for talking purposes. There are thirteen relays, three serving one purpose, viz.: the relays R, R^2 and R^4, and the relays R^1, R^3, R^5 and R^7 etc., serving another purpose. Each of the latter relays is under the control of a switch U^1, and each of the three first-mentioned relays is under the control of a key T. Thus, if it is designed to connect the line 12 with the line 1, for instance, the button U' is depressed, which connects this line with a line running into the bank in which line 1 is situated, and then, by depressing the key T', the relay R completes the connection. Thus, by the operation of the keys U and T, which operate thirteen relays, the line 12 may be connected with any one of thirty lines.

CALLING DEVICE.

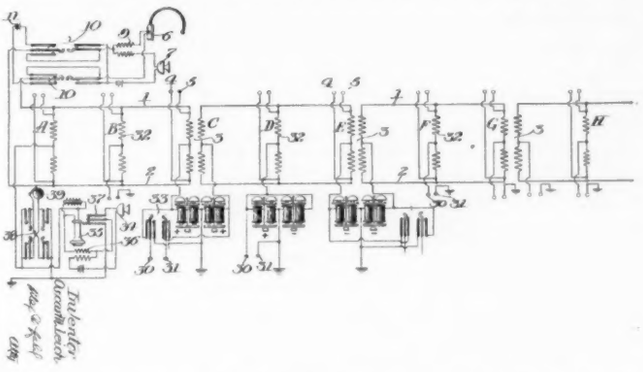
C. A. Anderson, Salina, and W. Hagstrom, Lindsborg, Kan., patent 938,944, Nov. 2, 1909; assigned to Anderson Elec. & Mfg. Co., McPherson, Kan., and Hagstrom Bros. Mfg. Co., Lindsborg, Kan.

This is a calling device for telephone exchange purposes where step-by-step sub-station devices are employed. It consists in the provision of means whereby a plurality of buttons are set corresponding to the various stations which it is desired to call, and then a rotatable element is set in operation, which, by its initial movement, sends a release impulse over the line, and then sends a series of operating impulses and calls each station of which the key happens to be depressed, and at the end sends a plurality of short ringing impulses to signal the stations selected by impulses in the intermediate positions.

SIGNALING SYSTEM.

Oscar M. Leich, Genoa, Ill., patent 938,155, Oct. 26, 1909, assigned to Cracraft-Leich Electric Co., Genoa, Ill.

This telephone system is more particularly of use in connection with telephone dispatching systems for railways, and is designed as an improvement over the system shown in patent No. 938,154, in that less repeating coils are required to establish the same kind of service, that is, metallic talking for the train dispatcher, and local or block conversation between the stations without affecting the metallic service. The stations C, D and E illustrate that no repeating coil is interposed between C and E, but to avoid difficulty in calls for block service, between the three stations on the same uninterrupted metallic wire, polarized bells are used, which



indicate to the operator when he is wanted for block or local service. The metallic train dispatcher's line carries selective step-by-step or other suitable signaling means.

TELEPHONE EXCHANGE SYSTEM.

Chas. L. Zahm, Los Angeles, Cal., patent 938,541, Nov. 2, 1909; one-fourth assigned to Edward E. Clement, Washington, D. C.

This invention is designed to provide means whereby an automatic exchange may work in harmony with a manual exchange, being particularly applicable for those cities where one branch exchange is manual and another branch exchange automatic. The device consists in automatic switches which are so arranged as to connect a calling subscriber directly with a trunk line running to the manual board. Such manual board can be operated in the ordinary way, and means are also provided whereby the automatic exchange can connect directly with a line which enters a manual exchange.

In the Manufacturing Field

Chicago Electrical Show.

There is every reason to believe that the 1910 Electrical Show, to be held in the Coliseum from January 15 to 29, will be the most successful and interesting of the several shows the Electrical Trades Exposition Company has given in Chicago. The demand for space is far ahead of any previous year at this time and many leading concerns have taken more space than heretofore with the idea of making larger exhibits. Contracts have already been signed with the following: American Steel & Wire Company, Swedish-American Telephone Company, Duntley Mfg. Co., Driver-Harris Wire Co., Grand Lodge Clay Product Company, Mathias Klein & Sons, Appleton Electric Co., General Electric Company, The Westinghouse Company and Telephony Publishing Co.

THE STROMBERG-CARLSON TELEPHONE MFG. COMPANG, Rochester, N. Y., has issued a revised bulletin on "Mine Telephones," which fully describes and illustrates its well known equipment for this class of service.

The instrument since it was first put upon the market has received certain improvements which add to its efficiency and durability as well as moisture excluding qualities.

The switchboard designed for use with the mine telephones exemplifies to a high degree the desirable qualities of compactness and ability to resist hard usage.

New Kellogg Board for Crawford, Neb.

Mr. L. R. Foote, the Nebraska representative for the Kellogg Switchboard & Supply Co., reports the closing of a contract for a common battery multiple switchboard and telephones for the Crawford Telephone Co., Crawford, Neb.

This board will be in the Kellogg Company's latest type 3,000 line section, and while the present equipment is only for 300 common battery lines and 20 rural and toll lines, the telephone company expects to be operating many times this number of telephones within the coming year.

The line construction in connection with this plant is far in advance of most towns of its size, the major portion of the lines being distributed through cable.

This company has looked far enough ahead to realize that the success of its undertaking depends in a very large measure upon the ease with which it can come into contact with neighboring towns and distant cities. Toll lines in service and under construction connect or will connect Crawford with all of the principal cities of the middle West.

Like many telephone companies in the Western states, the Crawford Telephone Company is purchasing the very best equipment that money can buy for both inside and outside plants.

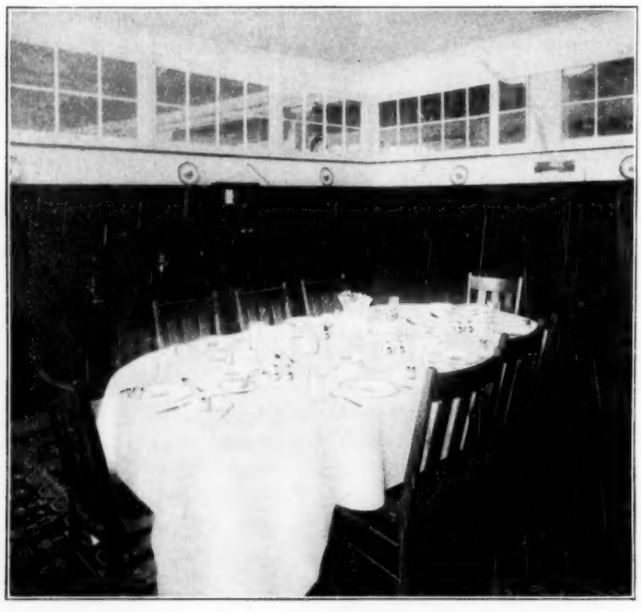
The Swedish-American Dining Room.

Up at the big Swedish-American factory at Summerdale Station on the Northwestern railroad, in Chicago, while they turn out an immense amount of work they believe in doing things comfortably, and the spirit of co-operation is responsible for many of the good results obtained by this organization.

The influence of the "get together" idea is recognized as a benefit both to the firm and its customers. One of the most pleasant ways in which this policy is carried out is the daily luncheon, in a quiet, tastefully arranged room, shown in the illustration. Here are found during the noon hour, president E. B. Overshiner, secretary A. V. Overshiner, and the heads of departments, or as many of them as are in the factory during the luncheon hour.

This luncheon gives opportunities for discussing, in an informal way, the things which are going on, and getting each man's views on topics suggested by recent occurrences, whether by a letter from a customer, or something which has taken place in the factory or shipping department. So the daily luncheon is an influence for efficiency and harmony which is felt throughout the factory.

Of course, anyone who knows the Swedish-American people realizes that they do not "talk shop" all the time, and a visitor to the table will find himself in a social atmosphere



Dining Room in the Swedish-American Factory.

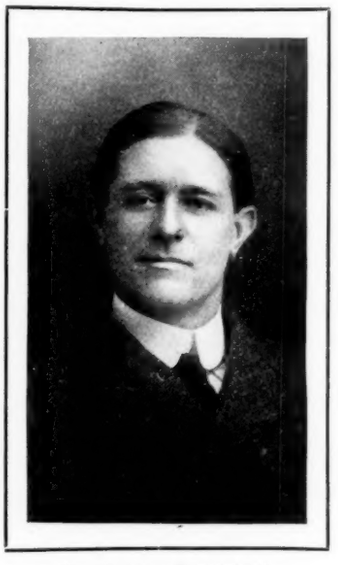
which will make him realize why the dining room is one of the most important features of the Swedish-American factory.

The company's friends who attend the convention in December are invited to visit the factory and join the officers of the company and department heads at luncheon in this room.

New Member of North Sales Staff.

The North Electric Company announces the appointment of Mr. George B. Wright as assistant sales manager for the western territory, with headquarters at Kansas City. The North Electric Company has maintained a branch at Kansas City for the past four years, and for the past two years has been under the supervision of Mr. D. E. Whipple. The business at this branch has grown to such proportions that it has become necessary to increase the present sales force.

Mr. Wright has had a wide experience in the construction and operating branches of the telephone business, having been engaged continuously in the business since 1878, at which time he began his telephone career with the Bell Telephone Company of Philadelphia. While in its employ and that of the Missouri & Kansas Telephone Company of Kansas City, with whom he was connected for ten years, he passed through the various stages of the business,—from operator to inspector, to wire-chief, to exchange manager. He entered the Independent field in Pennsylvania and New York state in the employ of the United Telephone & Telegraph Company.



Mr. George B. Wright.

During seven years ending 1908, Mr. Wright has been located at Binghamton, N. Y., as general superintendent of the York State Telephone Company, resigning that position to enjoy a year on the Pacific Coast. His intimate knowledge of the requirements of both large and small telephone plants, and valuable experience, make him particularly well-fitted for this position.

The C. A. Wood Preserver Company, Austin, Texas, is sending out folders describing the characteristics of C. A. Wood Preserver. The circular carries, over the signature of E. P. Shoch, Ph. D., Associate Prof. Chemistry, the University of Texas the statement that C. A. Wood Preserver consists of high boiling tar oils, free from pitch, carbon, petroleum or similar adulterations. Detailed results of tests are reported as follows:

Flash point, above 140° centigrade, tested in "open" dish.
Burning point, above 167° centigrade, tested in "open" dish.
Amount of distillate obtained with standard (Engler) distilling flask:
Up to 270° centigrade ½% or less.
Up to 300° centigrade 8% or less.
Tar acids, less than 1%.
Specific gravity at 20° centigrade, 1.138.
Sulphonation test yields no residue, (see U. S. Forest Service, Cir. 112).
Reddish brown color, agreeable odor.
U. S. Forest Service method of analysis used.

The Star Expansion Bolt Co., makers of the well known Star expansion bolts and other specialties, has moved its New Orleans sales office to 504 Audubon Bldg., where strangers and friends alike will be welcomed by D. S. Miller.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

PERSONAL.

MR. GEORGE F. DURANT, general manager of the Bell Telephone Company of Missouri, located at St. Louis, died recently at Boulder, Col.

JOHN W. LATHAM, for the past 2½ years connected with the engineering department of the Chicago Telephone Company, took a position as traveling inspector for the Southern Bell Telephone & Telegraph Company, with headquarters at Atlanta, Ga., on November 1.

NEW COMPANIES.

DE QUEEN, ARK.—The De Queen Telephone Exchange has purchased the new lines that run from Ben Lomond to Mineral Springs and thence to Nashville, from Ben Lomond to Brownstown. The purchase of these lines places all parts of Sevier county in telephonic communication under one system.

JONESBORO, ARK.—Farmers residing in Craighead county organized the Rural Telephone Company of Jonesboro recently. D. S. W. Moorland is president and W. I. Lindley, secretary. The object is for the betterment of the rural telephone service in that section.

MOSCOW, ARK.—The Moscow & Youngstown Telephone Company organized with P. C. Galloway, president; J. T. Conrad, vice-president; Ed. Young, secretary-treasurer and manager. Connecting lines will be built to Moscow, Garretson and Youngstown.

LA JARA, COLO.—The La Jara Telephone Company is the name of a new company incorporated with a $3,000 capital stock. Daniel E. Newcomb, Calvin L. Smith and William A. Braiden are the incorporators.

STANHOPE, IA.—Articles of incorporation of the Stanhope & Northwestern Telephone Company were filed with the Secretary of State a short time ago. H. M. Lucas, L. Q. Dick, J. Dick, John Reilly, S. J. Cottingham, J. H. McFarland, A. F. Elkins and Robert Fisher are the incorporators.

JACKSON, MISS.—The underground work of the Home Telephone is being rapidly completed. The cables are to be laid in paper composition pipes, embedded in concrete about one foot square. This part of the new system alone will cost close to $350,000

HELENA, MONT.—Lewis Pennell, of Helena, and M. N. Slevus, of Harlowton and others have filed articles of incorporation for the Meagher, Fergus Telephone Company. Capital, $40,000.

ALBANY, N. Y.—The Central Wireless Company has been incorporated to manufacture, purchase, acquire or deal in telephone and telegraph devices. The capital stock of the company is $1,000 and the principal office in New York. The directors for the first year are James R. McLean, Hotel Latham; Orley C. Granger, 49 Exchange Pl., and Richard E. Nebel, 274 Ryerson St., New York.

BELMONT, N. Y. (Franklin Co.)—The Allegany Telephone Company has been incorporated with a capital stock of $10,000. It will operate in Allegany county. The directors of the company are Robert E. Lang, George J. Fick and John B. White, of Belfast.

CATTARAUGUS, N. Y.—The Cattaraugus Union Telephone Company has been incorporated with a capital of $50,000 to operate in the counties of Niagara, Erie, Chautauqua, Cattaraugus, Orleans, Geneseo, Wyoming, Allegany, Livingston, Steuben and Monroe. The directors are John W. Morrison, Fred O. Goodwin, Fletcher W. Pike and George R. Fuller, of Rochester.

ATKINSON, N. C. (Pender Co.)—The Pender Telephone Company filed a certificate of incorporation with the secretary of state for the purpose of constructing and operating a telephone system. The authorized capital stock is $10,000. Dr. J. T. Haggard, E. E. Murphy, E. A. Hawes, Jr., and others are the incorporators.

NASHVILLE, N. C.—The Nashville & Castalia Telephone Company has been organized by S. J. Austin and S. J. Bartholomew. A telephone system will be established between Nashville and Castalia.

TIFFIN, OHIO.—The Tiffin Consolidated Telephone Company, with Lewis Selle, Jacob J. Fleck, Hiram W. Yeager, Wm. H. Kildow, A. A. Cunningham and I. C. Roger as incorporators, is the name of a new company recently organized with an authorized capital stock of $100,000.

SEDAN, OKLA.—The Saddle Mountain Mutual Telephone Company is the name of a new company recently organized by Amos M. Thompson and A. B. Meiner, of Sedan, and C. E. Evatt, of Saddle Mountain. The capital stock is $875.

GERRY, OKLA.—The Gerry Telephone Company is the name of a new company organized recently with a capital stock of $9,000. The directors are Horace Pureman, Ernst R. Truman and D. T. Pinkerton.

DOYLESTOWN, PA.—A rural telephone company was organized by farmers of Bedminster township. Dr. Wm. S. Nicholas is president; Joseph Diehl, secretary; John H. Mickel, treasurer.

MART, TEX. (Limestown Co.).—The Limestown Telephone Company is the name of a new corporation organized by Richard Blackwood, E. F. King and F. B. Moore. Capital stock, $4,500.

PHILLIPSBURG, TEX. (Washington Co.)—The Phillipsburg Telephone Company, with a capital stock of $1,000, was incorporated by John Stein, C. F. Meyer and C. C. Theil.

RICHMOND, VA.—The Morven Telephone Company, Hume, Fauguire county, Va., was recently incorporated, with a capital stock of $3,000. James R. Green, of Markham, Va., is president; E. Marshall Newton, secretary and treasurer; C. H. Corder, Edward Ambler, C. J. Yates of Hume, directors.

QUINCY, WASH.—E. O. Yeidell, E. L. Hoffman, A. Keigley, I. Chafee, A. R. Smith, W. H. Virginia and J. B. Morrison are the incorporators of the Grant County Telephone Company. The capital of the company is placed at $6,000.

FINANCIAL.

PEKIN, ILL.—The stockholders of the Farmer's Mutual Telephone Company will meet November 30th in Tremont for the purpose of increasing the capitalization of the company. This company now has about 1,000 telephones in operation and the constantly increasing business makes additions necessary.

YORK, NEBR.—The York County Telephone Company has decided to increase its capital to $50,000 and will place $25,000 worth of stock on the market. An eight per cent dividend is paid by this company yearly.

LOWVILLE, N. Y.—Stockholders of the Black River Telephone Company voted to replace the $25,000 of preferred stock part value $100, with $25,000 of common stock. Each share of the preferred stock will be replaced with ten shares of the common. The total capital of the company is $50,000 all of which is now common stock.

TROY, N. Y.—The Commercial Union's statement for the quarter ending October 1 showed gross earnings amounting to $52,-229.52; expenses, $23,905.39. $20,353.07 was used in paying interest on the funded debt, leaving a surplus of $7,971.17.

WILLSHIRE, OHIO.—The Willshire Telephone Company has amended its articles of incorporation increasing the capital stock from $20,000 to $50,000.

AUSTIN, TEX.—Among the corporations that paid their gross receipts taxes in the treasury department and filed their reports in the comptrollers' department for the quarter ending September 20, 1909, were the following: North Texas Telephone Company of Sherman, tax $52.83; gross receipts $3,488.79. Grayson County Telephone Company, tax $146.04; gross receipts $8,-735.93. Ellis County Independent Telephone Company, Ennis, tax $50.22; gross receipts $3,348.11. Haskell Telephone Company, tax $159.10; gross receipts $10,606.75.

FRANCHISES.

DETROIT, MICH.—An ordinance was passed granting the Home Telephone Company of Michigan permission to construct and maintain telephone lines in Grosse Pointe village. The rates to be charged are to be the same as in Detroit, and free service is to be given to that point.

ELIZABETH, N. Y.—The Hudson & Middlesex Telephone & Telegraph Company, it is reported, will soon make application to the city council for the privilege of building a conduit line through the city.

MEDFORD, ORE.—The city council has granted a telephone franchise to E. C. Sharpe, of Oakland, Cal. By the terms of the contract the work must start within four months.

CONSTRUCTION.

NEW HAVEN, CONN.—Reports have been made that the New Haven Railroad will install telephone service on the Northampton division of its system for train dispatching. The company has tested it in a small way and it seemed to be quite satisfactory.

ATLANTA, MICH.—T. C. Matthews, with D. Boner and A. Carrier, are constructing a metallic line from Atlanta to Hetherton. H. F. Barbour is putting up one from Hillman to Atlanta and this will make a complete circuit from Alpena to Atlanta. It is possible that this line will be continued to Gaylord and Boyne City to complete the circuit throughout that portion of the state.

LANSING, MICH.—According to reports Lansing is to have a new signal system for the police department. The board of councilmen will ask both companies operating in that city to make bids for the aerial wiring and underground conduit work for the installation of the flash-light system. It is thought possible that next year the board may purchase the wires and establish a plant of its own.

BROWNS VALLEY, MINN.—The Lake Traverse Mutual Telephone Company is connecting its line with the local system. The farmers residing in Roberts county are taking steps to construct a line.

MANKATO, MINN.—The Mankato Citizens' Telephone Company has been awarded the contract for equipping the Saulpaugh Hotel with a private branch exchange. A switchboard will be installed in the office, with telephones in each of the eighty rooms, connection being had with the central exchange

DILLON, MONT.—It has been reported that John C. Norvell, representing the Montana Independent Telephone Company of Butte, was in Dillon making arrangements for the building of lines from Whitehall to Dillon and from Twin Bridges to Virginia City.

HOOSICK FALLS, N. Y.—The Eastern New York Telephone and Telegraph Company has just put in operation a new common battery switchboard, 225 line equipment, 400 ultimate capacity. The constantly increasing demand for service necessitated this installation.

CLEVELAND, OHIO.—The Lake Shore & Michigan Southern Railway Company is installing telephones on its line between Oil City and Youngstown. General Superintendent John J. Bernet said: "We have used telephones in the dispatching service between Phalanx and Dillonville for two years and the line between Erie and Buffalo has been operated and has been satisfactory."

DEL RIO, TEX.—A metallic line connecting all the ranches in the Carta Valley has just been completed by the Del Rio and Western Telephone Company. Manager Rust reports that the line will be extended to Rocksprings, giving connection with Edwards.

MILES, WASH.—The Spokane & Columbia Rivers Telephone Company will soon construct a line from this place to Columbia, a distance of two miles.

WHITE BLUFFS, WASH.—The White Bluffs and Columbia River Telephone Company, which was organized recently and of which Fred M. Well is president is building lines extensively. An exchange is being installed at Wahluke and at Barrett Island. These two exchanges necessitate the company's crossing the Columbia river twice in seven miles. The extreme width of the river at Wahluke makes it a better proposition to lay submarine cable and this will be done. On the completion of this portion of the system, it will be extended to Priest Rapids, Haven, Beverly, and later on to North Yakima and Prosser.

TURTLE LAKE, WIS.—Hans Tvedt, J. Haughland, Mr. Grayton and Mr. Filiphy are interested in the construction of a telephone line in this vicinity.

WAUSAU, WIS.—At a meeting of the directors of the Marathon County Telephone Co. it was decided to install a local exchange in the village of Rib Falls. It was also decided to extend the line from that village eastward two and one-quarter miles. The matter of building a line from here to Kelly was discussed and the manager, W. H. Smale, was instructed to ascertain the prospects.

ELECTIONS.

FRANKLIN GROVE, ILL.—Reports from the Farmers' Telephone Company show it to be in good condition. It was noted that telephones were installed exceeding the number of any previous year in the history of the company. A. W. Crawford, F. M. Blowers and Wm. Becker were chosen as directors, succeeding themselves. The question of generally overhauling the lines of the company came up, and was favorably acted upon. Everything in the system is to be put into first class condition.

TAMAROA, ILL.—The annual meeting of the stockholders of the Tamaroa Telephone Company was held recently and the officers were re-elected. They are, Z. Hampleman, president; J. Edie, vice-president; Chas. Winthrop, secretary and treasurer; Edgar Mallow, Z. Hampleman and Frank Hitt, directors.

CONCORDIA, KAN.—At the meeting of the New Hope Telephone Company, D. R. Noe, A. D. Millirons, Wm. Johnson, Chas. Elliott, Wm. Leahy, Geo. Johnson, Henry Capes, Robert McLain and H. Graham were elected directors. The directors organized by electing Wm. Leahy, president, and A. D. Millirons, treasurer.

LONGTON, KANS.—In the reorganization of the Longton Telephone Company the following board of directors was elected. Geo. E. Harris, president; A. B. McKay, vice-president; L. Q. Adamson, secretary and manager; L. E. Roberts, treasurer and L. Hale, assistant treasurer. The company anticipates extending the service to the surrounding community.

AMHERST, OHIO.—The Amherst Home Telephone Co. held a special meeting Thursday for the purpose of filling the vacancy of secretary and treasurer, caused by the death of H. N. Steele. Dr. H. L. Hall was chosen for the position. E. C. Foster, Frank Steele and Henry Kolbe were elected directors.

AUSTIN, TEX.—Stockholders of the South Texas Telephone Company met in annual session recently and elected officers and directors, which are as follows: J. A. Quisenberry, Danville, Ky., prseident; John H. Robinson, Jr., Austin, vice-president; James W. McClendon, Austin, secretary; Robert E. Carrington, Austin, treasurer and auditor. With the exception of Mr. Carrington, the above mentioned, with J. B. Earle, Waco, S. J. Brooks, San Antonio, constitute the board of directors.

KAUKAUNA, WIS.—The incorporators of the Kaukauna Telephone Company held a meeting recently to complete the organization of the company. Five directors were chosen, E. T. O'Brien, F. M. Charlesworth, C. E. Raught, J. M. Jansen and Julius J. Martins. The directors organized by choosing officers as follows: President, J. M. Jansen; vice-president, C. E. Raught, secretary-treasurer, F. M. Charlesworth.

LOYAL, WIS.—The stockholders of the York Telephone Company held a meeting recently. The following officers were elected: President, B. Hill; secretary, W. J. Rush; treasurer John Vandeberg; director, C. B. Esselman. A committee was appointed to see all the stockholders of the company in regard to consolidation with the Loyal Telephone Exchange Company.

MISCELLANEOUS.

SAN DIEGO, CAL.—Horace B. Day has purchased the interests of Louis J. Wilde and Judson Bent in the Home Telephone Company. Mr. Day is president of the company and Mr. Wilde and Mr. Bent both had heavy interests in the company. Improvements to the amount of $40,000 which were announced some time ago as being under considration, will, it is reported, go on as outlined.

JACKSONVILLE, ILL.—The Central Union and Illinois Telephone companies are both heavy sufferers in a wind and electrical storm which recently passed over that section.

MACOMB, ILL.—The Illinois Western Telephone Company has now completed its new toll circuit, which gives service to practically all the important cities in Illinois and direct connection to St. Louis. Over $60,000 has been spent by the company within the past two years, it is reported. The company expects to continue the improvements, secure new franchises and build new lines as rapidly as possible.

SYRACUSE, IND.—The business portion of Cromwell, Indiana, was practically totally destroped by fire recently. The telephone exchange of the local company was among the big structures destroyed.

WHITEFISH, MONT.—The Big Bend Light & Power Company has purchased the telephone system of Carl Green, and the exchange will be moved into the company's new building.

AINSWORTH, NEBR.—Ainsworth telephone system was sold today to A. R. Workman of Danville, O. Possession is to be given at once.

ROCHESTER, N. Y.—Mayor Edgerton has received a report of the Committee on Fire Prevention of the National Board of Fire Underwriters on fire conditions, including fire alarm telegraph system conditions. The Commissioner of Public Safety is investigating to find a more reliable type of cable terminal. The National Board recommended "that circuits be placed underground in all built-up districts, using rubber-insulated wire in lead sheathing for future installations." This is being done and 65,000 feet of cable was installed in 1908 and 12,000 feet thus far in 1909. The National Board investigators say that the fire alarm system here is third in point of excellence in the U. S. It is being improved steadily and the alarm boxes are being rebuilt. A big general municipal movement is under way to place overhead wires underground and, wherever possible, shift street lines to back lot pole lines.

COLUMBUS, OHIO.—The Columbus Citizens' Telephone Company is considering the proposition of purchasing the Winchester business block at London, Ohio, for the housing of the London exchange which was recently purchased. Should the deal go through the telephone company will install a complete new exchange. The building is one of the modern blocks of London.

MECHANICSBURG, PA.—A fine of $8.75 has been imposed upon the Bell Telephone Company of Pennsylvania by Burgess Young, of Mechanicsburg, Cumberland county. Several of the company's poles were burned during a fire in the borough and in replacing them the company violated a local ordinance by planting a pole so close to a stable owned by Dr. John Kohn that the doors could not be opened. Orders by the burgess to abate the nuisance were ignored, and the fine was then imposed—and paid. Then the offending pole was removed.

AUSTIN, TEXAS.—Among the corporations that paid their gross receipts taxes yesterday in the state treasury department and filed their quarterly reports in the comptroller's department for the quarter ending September 30, was Brownsville Telephone Company, tax $40.77, gross receipts $2,718.22.

RACINE, WIS.—The Wisconsin Rate Commission decided in favor of the telephone company in a recent case wherein the telephone company claimed it could demand a deposit by a subscriber to service before installing a telephone.

UNDERGROUND.

OAKLAND, CAL.—The telephone companies have commenced the work of placing wires underground in this city, as was established by an ordinance recently passed by the City Council.

NASHVILLE, TENN.—Wires of the telephone company in this city are being placed in underground conduit. This is being done on recommendation of the city council.